5-2090-200-12+P

TM 5-2090-200-12 &P

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL

MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND

SPECIAL TOOLS LIST

CRADLE, BOAT, 27 FT:

BRIDGE ERECTION BOAT

NSN 2090-00-348-8138

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY

D 101.11:

MARCH 1976

WARNING

DEATH

or severe injury to personnel or damage to property may result if personnel fail to observe safety precautions.

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 F. — 138 F. (38 C. — 59 C.)

Do not perform any maintenance on the equipment while it is being operated.

CHANGE
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *8 March 1977*

Operator and Organizational Maintenance Manual

Including Repair Parts and Special Tools List

CRADLE, BOAT, 27 FT; BRIDGE ERECTION BOAT

NSN 2090-00-348-8138

TM 5-2090-200-12&P, 11 March 1976, is changed as follows:

1. The TM number is changed to read, "TM 5-2090-200-12&P".
2. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration identification number.

Remove pages	Insert pages
1-1 and 1-2	1-1 and 1-2
2-3 and 2-4	2-3 and 2-4
2-9 through 2-12	2-9 through 2-12
2-15 and 2-16	2-15 and 2-16
3-3 and 3-4	3-3 and 3-4
4-3 through 4-6	4-3 through 4-6
None	4-6.1
4-11/(4-12 Blank)	4-11/(4-12 Blank)
B-3/(B-4 Blank)	B-3/(B-4 Blank)
C-5 and C-6	C-5 and C-6.1
C-11 through C-14	C-11 through C-14

3. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

PAUL T. SMITH
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25D, Operator maintenance requirements for Boat Bridge Erection.

TM 5-2090-200-12&P
C1

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 5 August 1976

Operator and Organizational Maintenance Manual
Including Repair Parts and Special Tools List

CRADLE, BOAT, 27 FT; BRIDGE ERECTION BOAT

NSN 2090-00-348-8138

Current as of 14 June 1976

TM 5-2090-200-12&P, 11 March 1976, is changed as shown on the reverse of this page.

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:

PAUL T. SMITH
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25D, Operator Maintenance Requirements for Boat Bridge Erection.

INSTRUCTIONS

SHOWN BELOW ARE THE LATEST CHANGES TO NATIONAL STOCKNUMBERS (NSN) WHICH AFFECT ITEMS IN THE BASIC MANUAL. THE DATA IS ORGANIZED AS FOLLOWS: THE "FROM" COLUMN WILL SHOW THE OLD NSN, IF ONE WERE ASSIGNED. WHERE THE MANUFACTURERS PART NUMBER AND MANUFACTURERS CODE APPEAR IN "FROM" COLUMN REFER TO INDEX FOR LOCATION WITHIN MANUAL. THE "TO" COLUMN SHOWS THE NEW NSN. IN THE "FIG" COLUMN, THE NUMBER OF THE FIGURE WHICH ILLUSTRATES THE ITEM IDENTIFIED BY THE NSN IS SHOWN. THE "ITEM" COLUMN PIN-POINTS THE ITEM NUMBER OF THE SELECTED FIGURE WHICH IS IDENTIFIED BY THE NSN. IF FIGURE AND ITEM NUMBER ARE BLANK REFER TO THE INDEX FOR LOCATION WITHIN MANUAL. THE LAST COLUMN, "TM", IDENTIFIES THE TECHNICAL MANUAL IN WHICH THESE CHANGES SHOULD APPEAR. PEN-AND-INK CHANGES MAY BE MADE BY POSTING THE NEW DATA TO THE PARTS LISTINGS AND TO THE INDEX.

FROM		TO	FIG	ITEM	TM
M27426-21148	81349	5365010174612	C-4	5	TM5-2090-200-12

TECHNICAL MANUAL
No. 5-2090-200-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *11 March 1976*

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

CRADLE, BOAT, 27 FT; BRIDGE ERECTION BOAT

NSN 2090-00-348-8138

Current as of 14 December 1975

REPORTING OF ERRORS

You can help to improve this manual by calling attention to errors and by recommending improvements. Your letter, DA Form 2028 (Recommended Changes to Publications) or DA Form 2028-2 (Recommended Changes to Equipment Technical Manuals), may be used. Copies of DA Form 2028-2 are attached in the back of the manual for your use. Please mail your recommended changes directly to Commander, U.S. Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished directly to you.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual is for your use in operating and maintaining the Boat Cradle which is used to transport the 27 foot bridge erection boat and launch it from the Tactical Floating Bridge Transport.

1-2. Maintenance Forms and Records

a. Maintenance forms and records that you are required to use are explained in TM 38-750.

b. You are to use the record and report forms listed below for operator and organizational maintenance.

(1) DA Form 2400 (Equipment Utilization Record).

(2) DA Form 2401 (Organizational Control Record for Equipment).

(3) DA Form 2402 (Exchange Tag).

(4) DD Form 314 (Preventive Maintenance Schedule and Record).

(5) DA Form 2404 (Equipment Inspection and Maintenance Worksheet).

(6) DA Form 2407 (Maintenance Request).

(7) DA Form 2408 (Equipment Log Assembly).

(8) DA Form 2408-1 (Equipment Daily or Monthly Log).

(9) DA Form 2408-5 (Equipment Modification Report).

(10) DA Form 2408-9 (Equipment Usage Report).

(11) DA Form 2408-10 (Equipment Component Register).

(12) DA Form 2408-14 (Uncorrected Fault Record Vehicle)

1-3. Equipment Serviceability Criteria

This equipment is not covered by an ESC.

1-4. Destruction of Army Materiel to Prevent Enemy Use

a. Authority. The cradle will be destroyed if it is in danger of being captured and used by the enemy, and upon the order of the unit commander.

b. Methods. Remove the wheel assembly from the dolly and the roller assembly from the cradle and destroy. Destroy the same parts on all cradles to prevent enemy use through cannibalization. If possible, destroy the entire unit by placing an explosive charge between the dolly and cradle. Be sure to obliterate all serial numbers, nameplates, and unit markings.

1-5. Administrative Storage

a. Preparation of Equipment.

(1) Select the best available site for storage and separate stored equipment from equipment in use. Conspicuously mark the area "Administrative Storage". Covered area is preferred.

(2) Store equipment so as to provide maximum protection from the elements.

(3) Prior to storage, perform the next scheduled major preventive maintenance service. Inspect and approve equipment prior to storage.

b. Care of Equipment.

(1) Perform regularly scheduled inspection of equipment.

(2) Keep equipment in an optimum state of readiness.

(3) Rotate items in accordance with a rotational plan that will keep the equipment in an operational condition.

c. Removal of Equipment From Administrative Storage.

(1) Restore equipment to normal operating condition in accordance with pertinent technical manuals.

(2) Resume the maintenance service schedule in effect at the commencement of storage.

d. For further instructions, refer to TM 740-90-1.

Section II. DESCRIPTION AND DATA

1-6. Description

The Boat Cradle (fig. 1-1) is used to support the assembled 27-foot Bridge Erection Boats. The Cradle is used to transport the boat on and launch it from the Tactical Floating Bridge Transporter (TM 5-5420-209-12).

The Cradle is constructed of an aluminum cradle frame with a captive cradle dolly, four guide stanchions, a latch-release, lashing ropes, cable assemblies and tie-down hooks.

1-7. Tabulated Data

a. General.

Manufacturer	Pacific Card Foundry
NSN	2090-00-348-8138

b. Dimensions and Weight.

Length	275.38 inches (69.95 meters)
Width	105.72 inches (26.88 meters)
Height	71.72 inches (18.16 meters)
Weight (Total)	1,975 (895.73 kgs)
Weight (Cradle support and roller assy.)	175 pounds (79.45 kgs)

c. Dimensions and Weight (with cradle and boat loaded on transporter).

(1) *Dimensions.*

Length	449 inches (114.05 meters)
Width	136 inches (34.55 meters)
Height	162 inches, 144 inches min. (41.15 meters, 36.58 meters min.)
CG Length	213.40 inches (54.20 meters)
CG Height	55.24 inches (14.03 meters)

(2) *Weight.*

Front Axle	10,270 pounds (4,662.58 kgs)
Inner Axle	12,935 pounds (5,872.49 kgs)
Rear Axle	12,935 pounds (5,872.49 kgs)
Total	36,140 pounds (16,407.56 kgs)

Key to figure 1-1

1 Cradle guide stanchion
2 Lifting bracket
3 Access cover
4 Intermediate support
5 Tie down bracket
6 Lashing rope
7 Boat guide stanchion
8 Push-pull release cable
9 Boat cradle dolly
10 Tie-down bracket
11 Guide and locking bracket
12 Cradle guide roller
13 Stop pin (forward)
14 Lifting bracket
15 Tie-down brackets
16 Tie-down bracket
17 Stop pin (rear)

Figure 1-1. Boat Cradle.

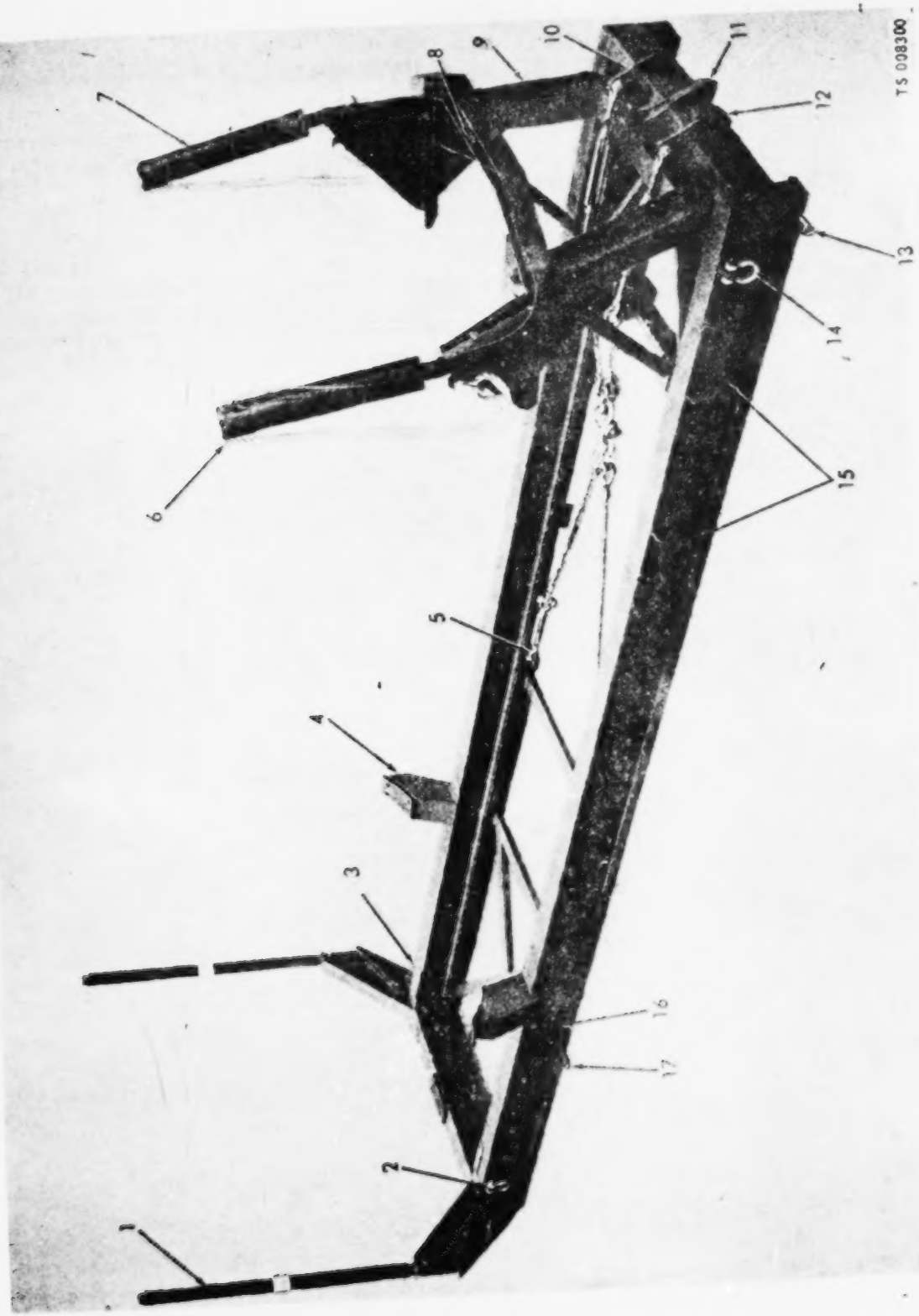


Figure 1-1. Boat cradle

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. OPERATING PROCEDURES

2-1. General

The Boat Cradle is used to support the 27-foot bridge erection boat while stored on a hardstand or transporter (fig. 2-1), to load itself and the boat onto the transporter from a hardstand by using the transporter boom and winch, to transport the boat, to launch the boat, to retrieve the boat from the water, and to set itself and the boat off of the transporter by using the transporter boom and winch.

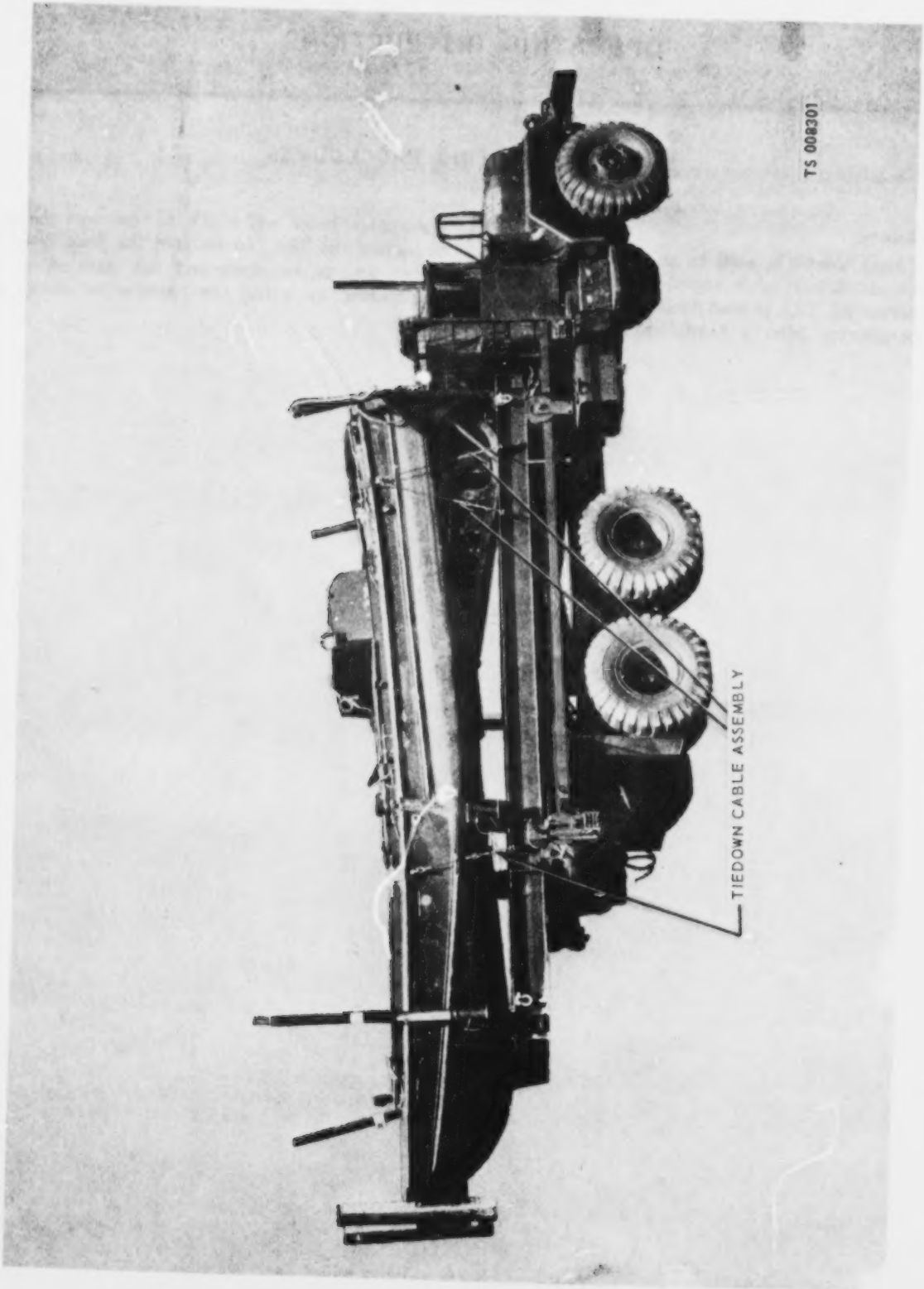


Figure 2-1. The boat loaded for transporting.

2-2. Loading

a. Loading the Boat and Boat Cradle. To load the boat cradle with the 27-foot boat on it onto the tactical floating bridge transporter from a hard-stand, use the rear winch and boom on the transporter and proceed as follows:

(1) Remove the anchor snatch block (fig. 2-2) from the transporter boom.

(2) Install the left and right inboard roller assemblies on the rear support of the transporter, as shown in figure 2-3, so that the rollers are positioned at the bases of boom legs.

(3) Make sure the inboard roller assemblies are swung upward until a travel is stopped by the seating of the cradle stop bracket against the inclined surface on the transporter boom. The correct position is shown in figure 2-4. Tighten the roller bracket bolts to secure the roller assemblies in the correct position.

(4) Place the transporter into a load position.

(*a*) Start the transporter (refer to TM 9-2320-260-10).

(*b*) Use an assistant to guide the driver and back the transporter into position so that the rear support is about one foot in front of the forward (dolly) end of the boat cradle. Make sure that the boat cradle side beams are in line with the inboard rollers on the transporter rear support.

(*c*) When positioned, depress the clutch pedal, place the transmission shift lever in the neutral position, engage the parking brake, engage the power take-off control lever for the hydraulic pump by pushing the lever down and release the clutch pedal.

(*d*) Set the hand throttle so that the transporter engine operates at 1,700 RPM.

(*e*) Take your position as driver/operator at the hydraulic controls located on the left side behind the cab and station an assistant near the latch block of the boat cradle.

(*f*) Engage the hydraulic control lever to disengage the forward tie down pin (fig. 2-4) and push the hydraulic winch control to pay out enough slack in the boom cable so that the hook reaches the ground.

(*g*) Push the hydraulic boom elevation control (outside lever) to raise the boom. Raise the boom until it passes slightly beyond vertical, so that the cable will clear the rear support. Pay out the boom cable until there is about three feet of slack on the ground.

(5) Lift the latch hook on the boat cradle and secure it in the unlatched position. Remove the retainer (9, fig. 2-5) from the screw (10), and remove the screw (10) and the latch block (11).

(6) Place the boom cable on the sheave, thread it through the hole in the front beam of the dolly, and engage the cable hook in the eye on top of the dolly base.

(7) Reinstall the latch block (11), retaining screw (10), and retainer (9), so that the boom cable runs between the latch block and the sheave (7). Release and relatch the latch hook (18).

(8) Pull the winch control lever to rewind the boom cable. Lift the dolly end of the boat cradle until the forward cradle stop pins will clear the stop brackets on the rear support inboard rollers.

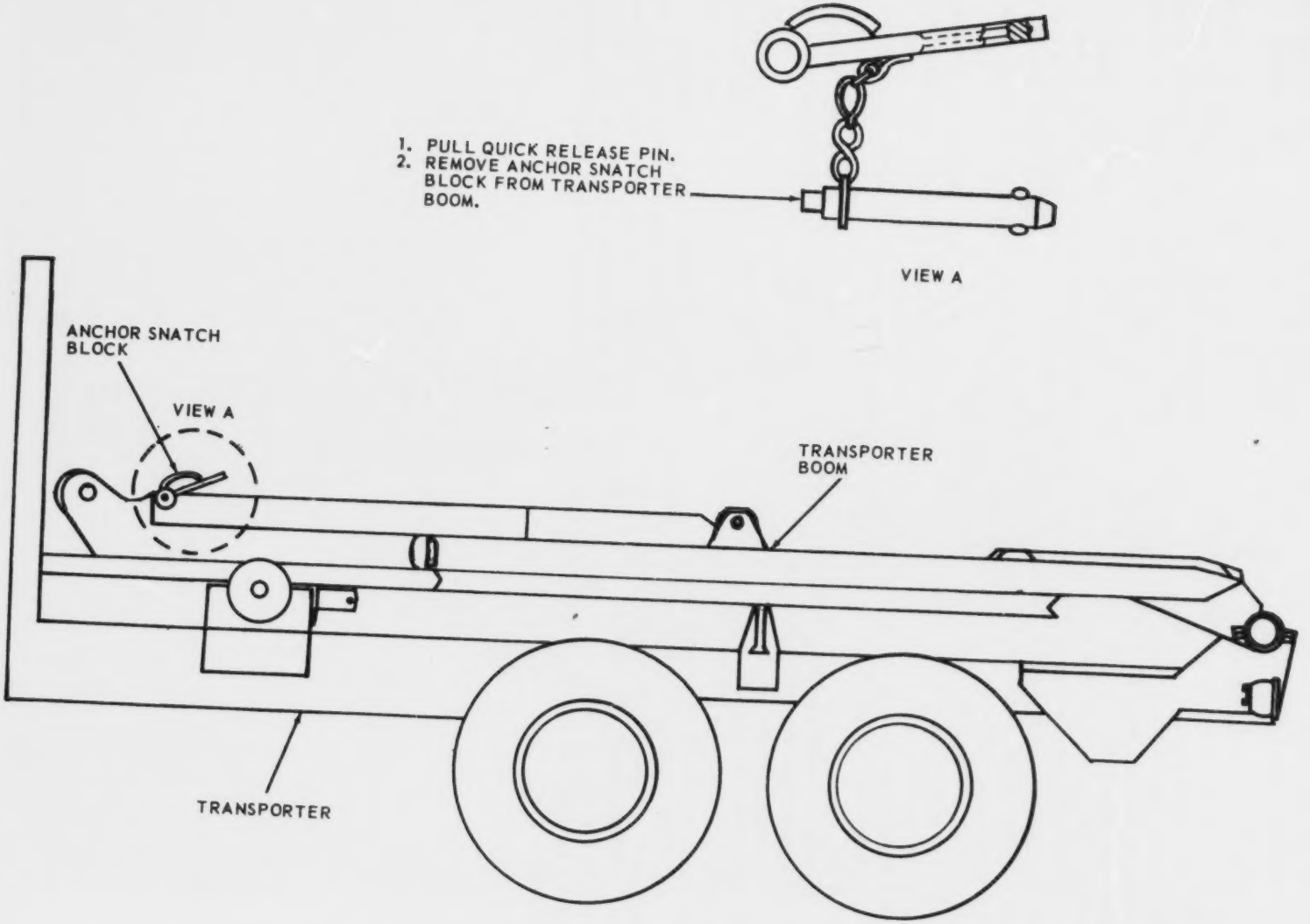


Figure 2-2. Anchor snatch block.

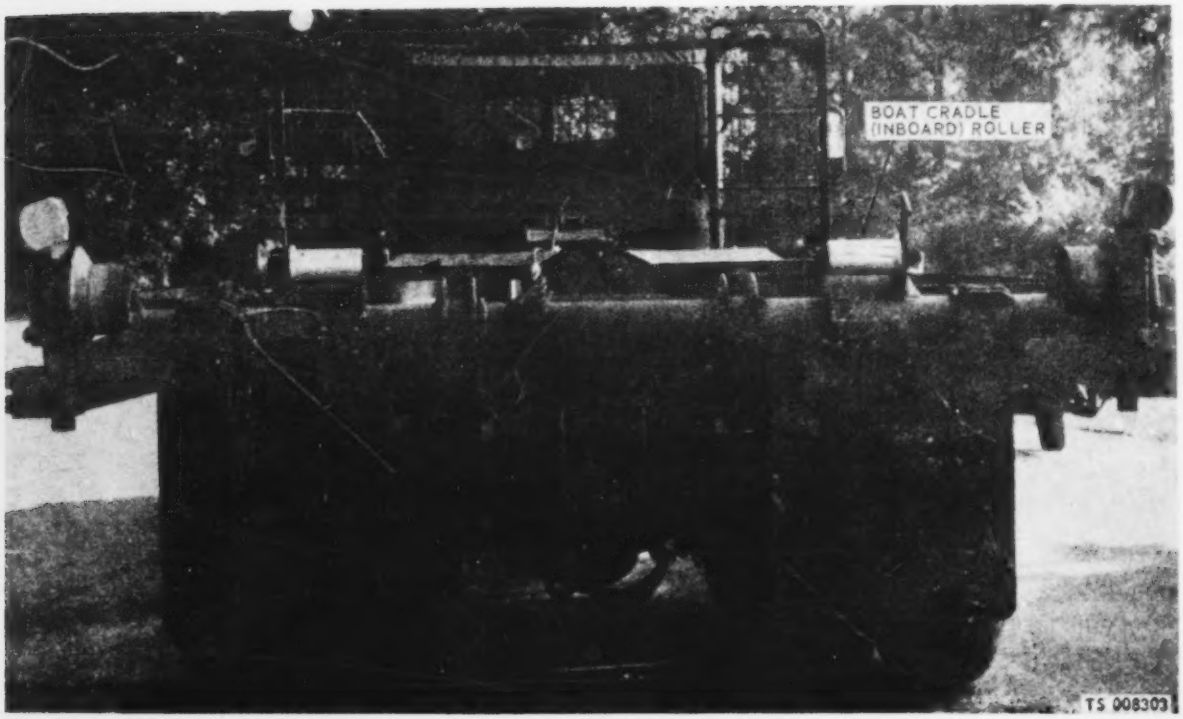


Figure 2-3. Roller assemblies.

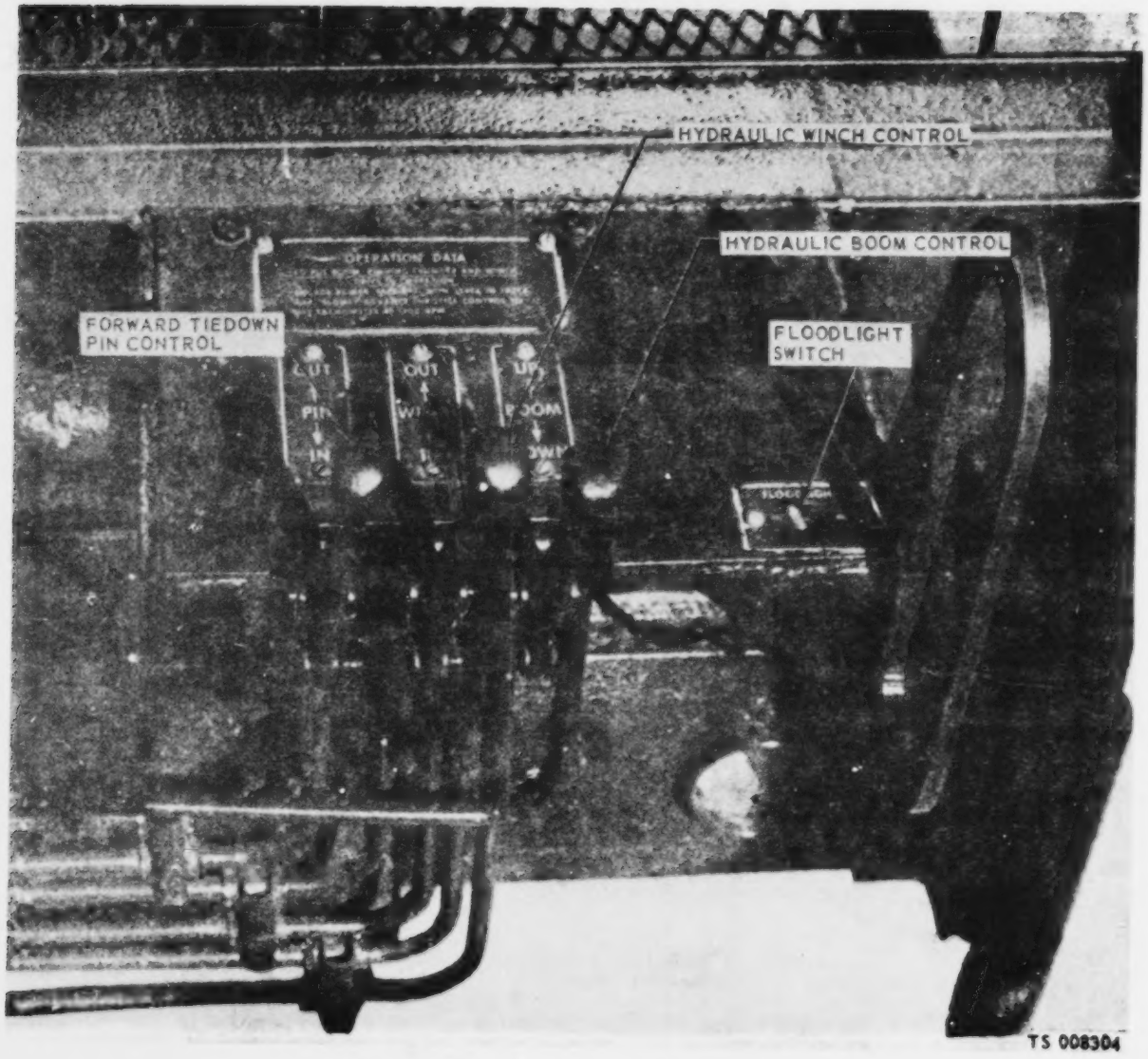
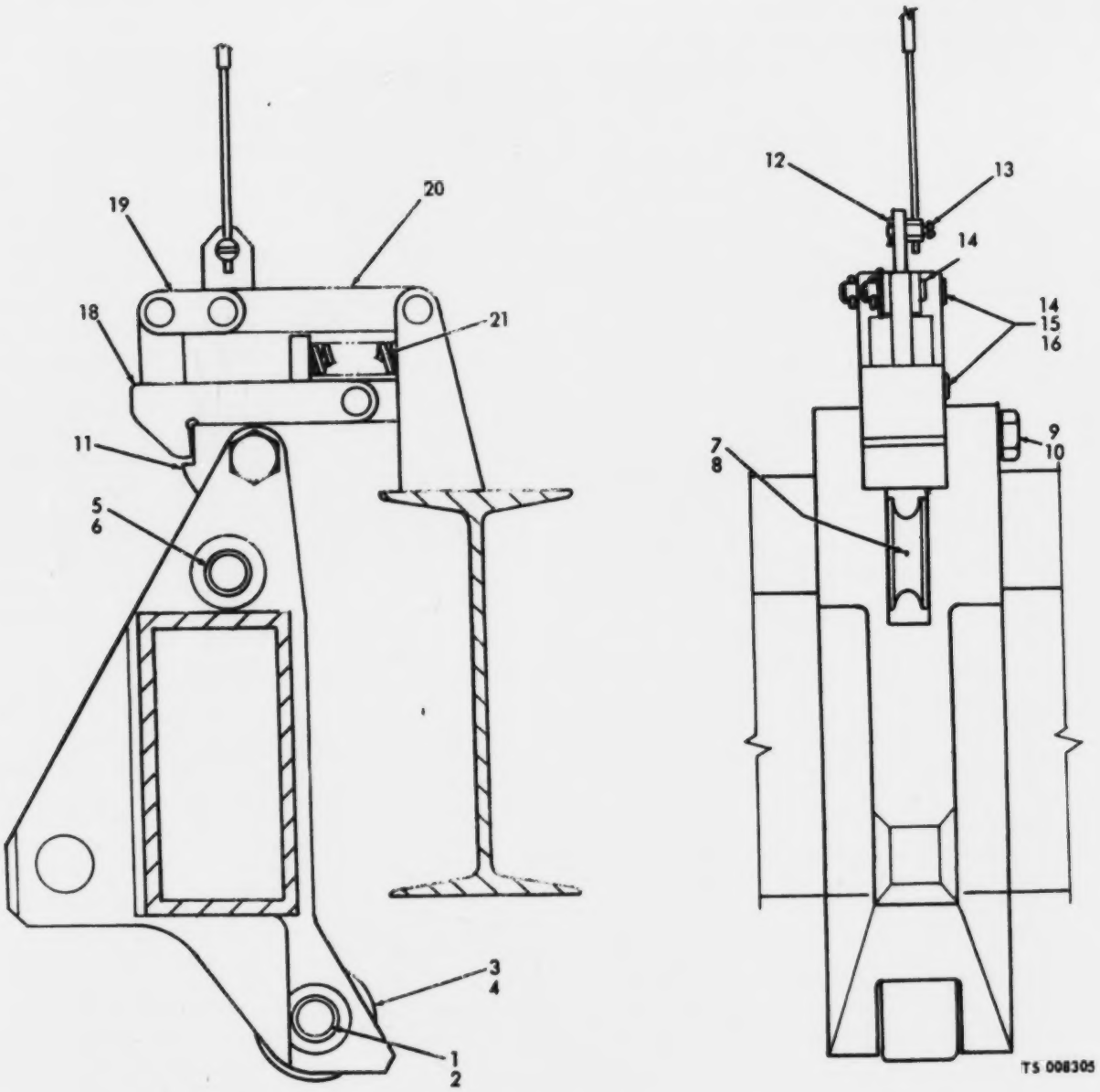


Figure 2-4. Transporter boom hydraulic controls.



1. Retaining ring
2. Roller axle
3. Roller
4. Bearing
5. Retaining ring
6. Sheave axle
7. Sheave
8. Sheave bearing
9. Retainer
10. Capscrew
11. Block latch
12. Cotter pin
13. Cable stop
14. Cotter pin
15. Washer
16. Pin
17. Pin
18. Hook latch
19. Sink clevis
20. Sink
21. Latch spring

Figure 2-5. Block latch assembly.

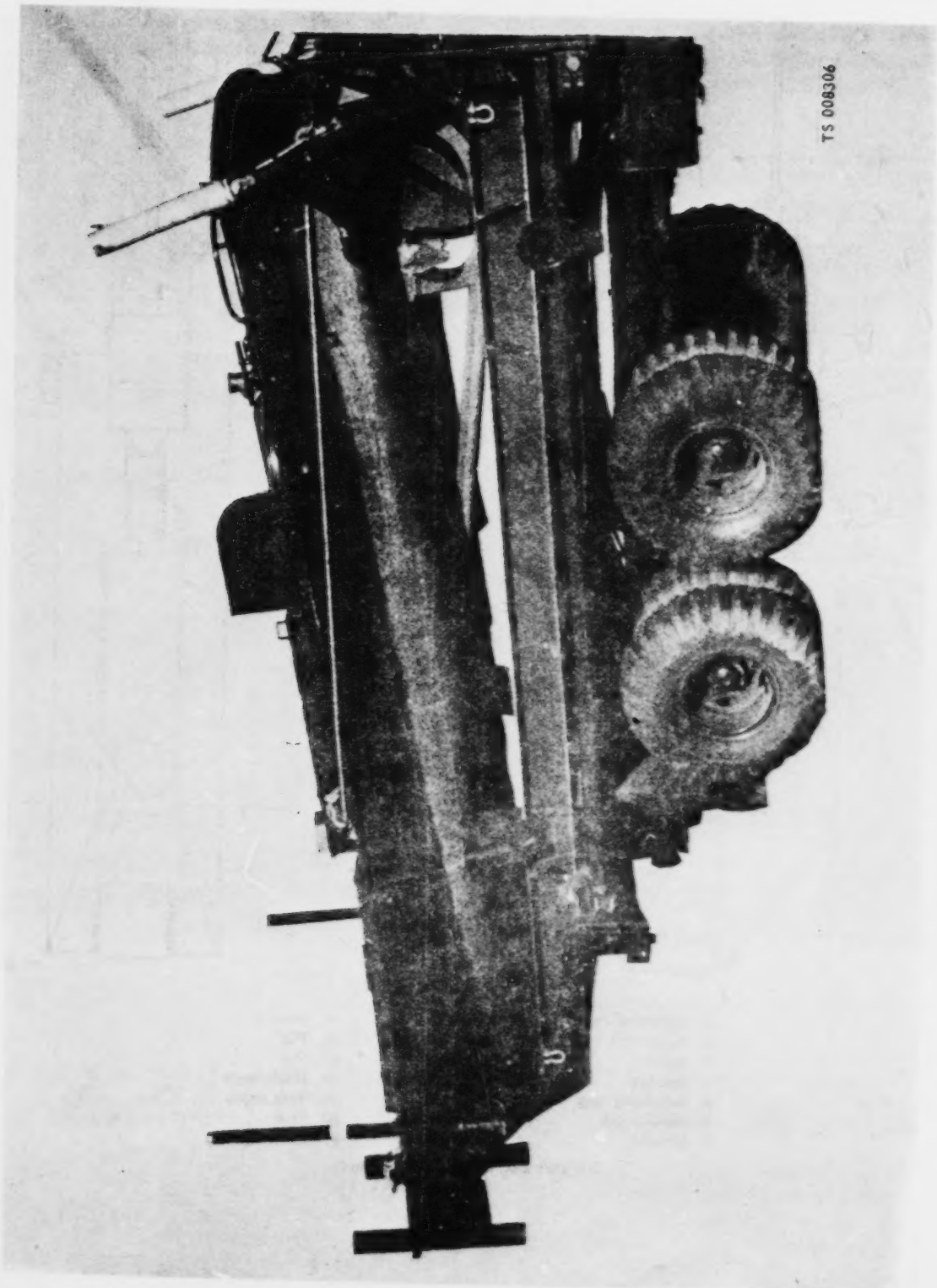


Figure 2-6 Boat prepared for launching.

(9) Pull the elevation control lever to retract the boom. Operate the winch as needed to position the guide and locking bracket of the boat cradle so that it engages the center slot of the boom. Pay out the cable until the front cradle stop pins rest on the rear support roller stop brackets, then retract the boom to about a 15-degree angle with the ground.

(10) Rewind the winch to pull the boat cradle onto the transporter. Continue to rewind the winch cable and lower the boom until the boat cradle is stopped by seating of the rear cradle stop pins against the stop brackets, or until guide brackets contact the boom sheave. Operate the control lever to engage the forward locking pin.

(11) Secure the boat and cradle to the transporter by attaching the tie down cable (fig. 2-1) to the bracket on the front transporter chassis. Tighten the cable by turning the turnbuckle.

(12) Return the hand throttle to idle position, depress the clutch pedal, lift the control lever to disengage the power take off, select the proper range for the transfer case, disengage the hydraulic brake lock and drive the transporter to the desired location.

CAUTION

Be careful not to allow the bow of the boat to contact the ground while being pulled onto the transporter.

b. Loading the Boat Cradle. The transporter boom can also be used to load the empty boat cradle onto the transporter. The procedures are the same as for the boat and boat cradle (para *a*), except the part that describes the procedure for securing the boat to the boat cradle.

2-3. Launching the Boat

a. Select or prepare a launch site having stable soil, a uniform bank and streambed slope of 20 percent or less. The site will also have a water depth of 60 inches or more at and beyond the launch point, and a stream velocity of not more than 10 feet per second.

b. Make the following preliminary preparations at a suitable location near the launch site.

(1) Remove all tie-down cable assemblies from the cleats.

(2) Tie the boat to the dolly, using two ropes on the dolly and two of the cleats from which the tie-down hooks were removed. Make certain that the latch hook is latched.

(3) Remove the two tie-down cable assemblies from beneath the stern of the boat.

(4) Check and service the boat.

c. Drive the transporter to the launch site and back it into position near the water (fig. 2-6). Have the boat operator assume his position in the boat.

d. Back the transporter into the water until the running board clears the water by about 6 inches (15.25 cm). Do not submerge the boom winch.

e. Apply the transporter service brakes, depress the clutch pedal, place the transmission shift lever in neutral position, lock the parking brakes, depress the control lever to engage the power take-off and release the clutch pedal. Set the hand throttle so that the transporter engine operates at 1,700 RPM.

f. Remove quick release pin from locking pin and engage the hydraulic control lever to engage the hydraulic control lever to disengage the forward locking pin. Raise the boom about 10 degrees.

g. Push the hydraulic winch control lever to pay out the boom cable and allow the boat cradle to slide into the water. The bow of the boat will enter the water when the end of the boat cradle is submerged, as shown in figure 2-7. The boat cradle will begin to tilt when the center of gravity passes the inboard rollers on the rear support. Continue to pay out the boom cable and adjust the boom elevation until the cradle guide stanchions are submerged to the white rings and the end of the boat cradle is resting on the stream bed.

CAUTION

Do not pay out the boom cable after the front cradle stop pins engage the stop brackets on the rear support inboard rollers. The water is not deep enough or the transporter has not been backed far enough if this occurs before the cradle guide stanchions are submerged to the white rings.

h. Have boat operator pull the push-pull cable to release the latch hook while the boom cable has tension on it and pay out more boom cable, so that the dolly travels down into the water until it stops, as shown in figure 2-7.

i. Signal the boat operator to cast off, at which time he will—

(1) Untie the ropes from the cleats on the stern section and insert rope ends into the tops of boat guide stanchions (fig. 2-8).

(2) Start and operate the boat.

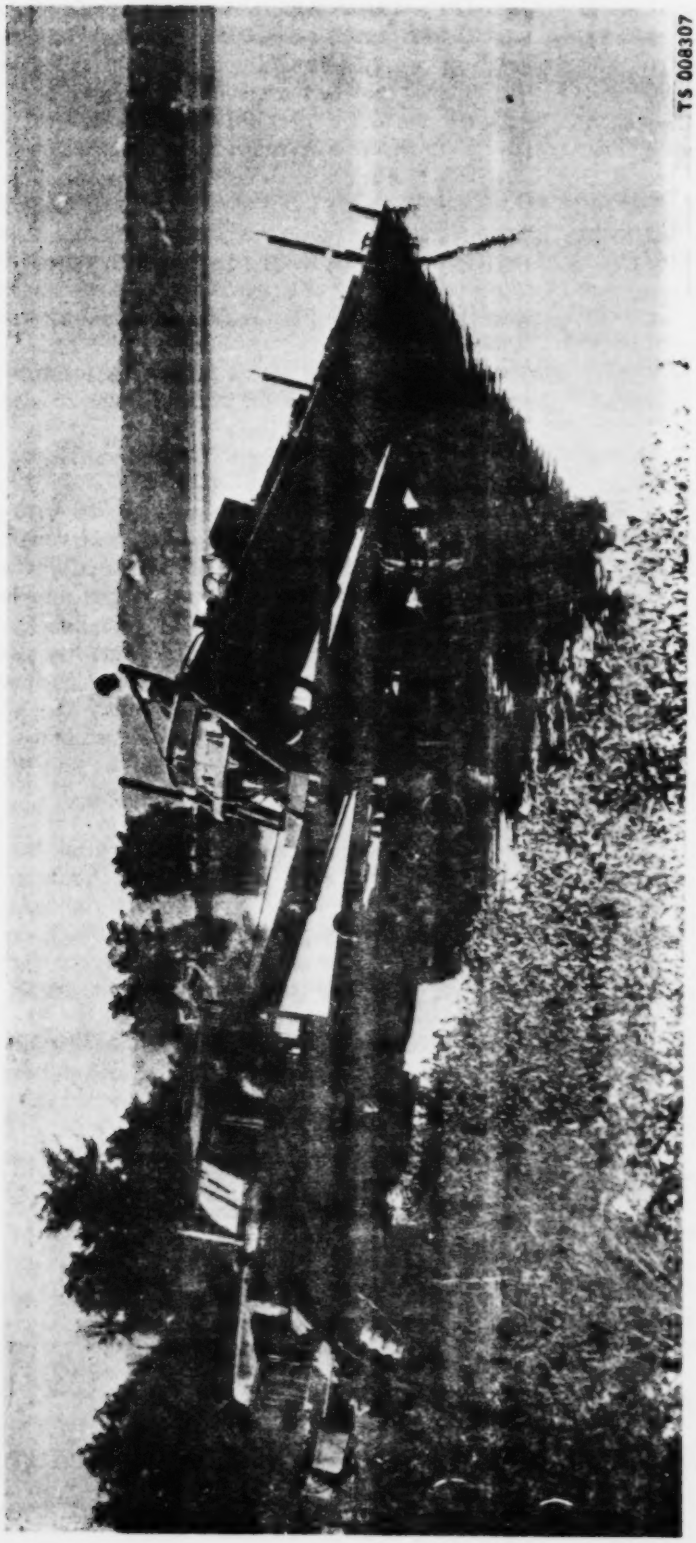


Figure 2-7. Launching the bridge erection boat.

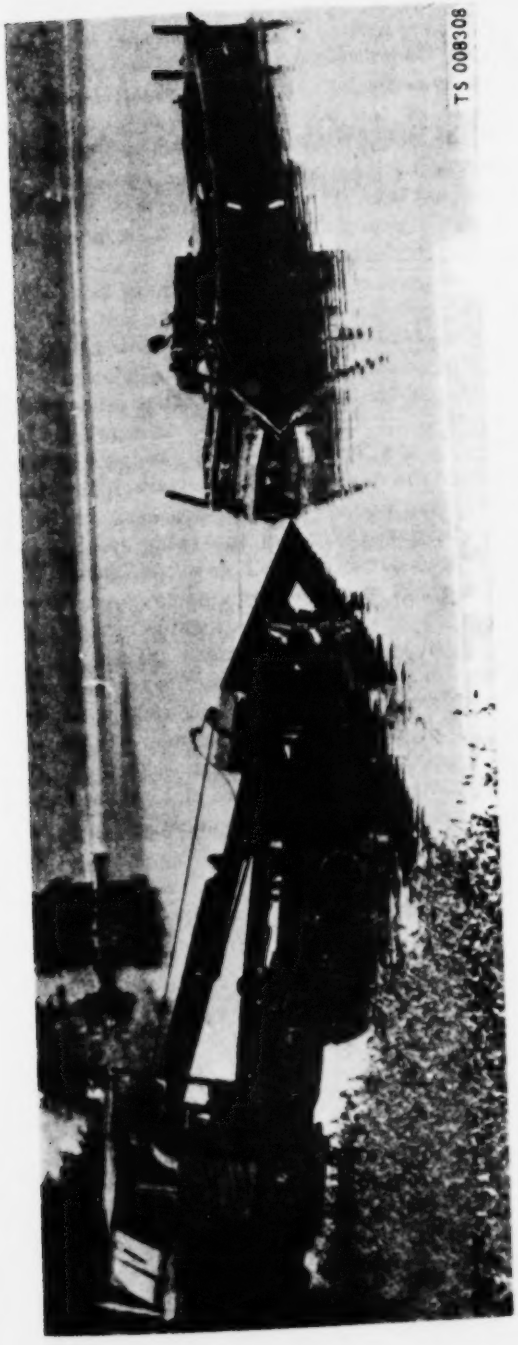


Figure 2-8. The boat launched ready for cast off.

j. After the boat has cleared the cradle guide stanchions, rewind the boom cable and retract the dolly until it is fully forward and latched. Continue to rewind the boom cable and adjust the boom elevation as needed, so that the boat cradle is retrieved in accordance with paragraph *a*(10) above.

k. Disengage the power take-off (para *a*(11)) and return the transporter to the shore.

2-4. Retrieving Boat From Water

The boat cradle is used to retrieve the boat from the water.

a. Select or prepare a site having the same conditions required for a lunching site (para 2-3*a*).

b. Unlatch the latch hook and secure it in the unlatched position.

c. Back the transporter into the water and position the boat cradle in accordance with paragraph 2-3*d* through *h*. It may be necessary to move the truck forward if the boat cradle is not extended enough to seat the stop pins against the stop brackets.

d. Signal the boat operator to approach and tie up to the boat cradle (fig. 2-9). The operator will proceed as follows:

(1) Approach the stanchions from the downstream side, backing the boat into position as shown in figure 2-1.

(2) Back the boat into the dolly with the throttles, being careful not to put the rudders hard over. Continue backing until the dolly begins to move up the cradle. Secure the lines and shut off the boat engines

(3) Tie the boat securely to the dolly, using the two ropes from the dolly and the cleats on the stern section, figure 2-10, then signal the transporter operator to retrieve the boat.

e. Pull the hydraulic winch control lever to rewind the boom cable and retract the dolly. As the stern emerges from the water, make sure that the bottom of the boat is seated on the rubber pads of the dolly. Continue to rewind the boom cable and adjust the boom elevation as needed, so that the boat and the boat cradle are retrieved (para 2-3*j*). Figure 2-11 shows the boat and boat cradle being retrieved from the water.

f. Disengage the power take-off (para 2-2*e*) and return the transporter to the shore. Move the loaded transporter to a suitable location near the retrieval site and tie down the boat as follows:

(1) Attach the six tie-down cable assemblies from the sides of the boat cradle to four of the cleats on the boat, using the four tie-down hooks connected to the cable assemblies. Attach the two stern tie-down cables to the brackets on the transporter chassis. Tighten the cable assemblies by turning the turnbuckles. Figure 2-1 shows the correct placement of the tie-down cable assemblies.

(2) Attach the four tie-down cable assemblies from the boat cradle to the keel of the boat. Attach the short cables to the brackets at the front of the boat cradle. Attach the long cables to the brackets on the frame crossmember near the center of the boat cradle. Tighten the cable assemblies by turning the turnbuckles. Figure 2-1 shows the correct placement of the tie-down cable assemblies.

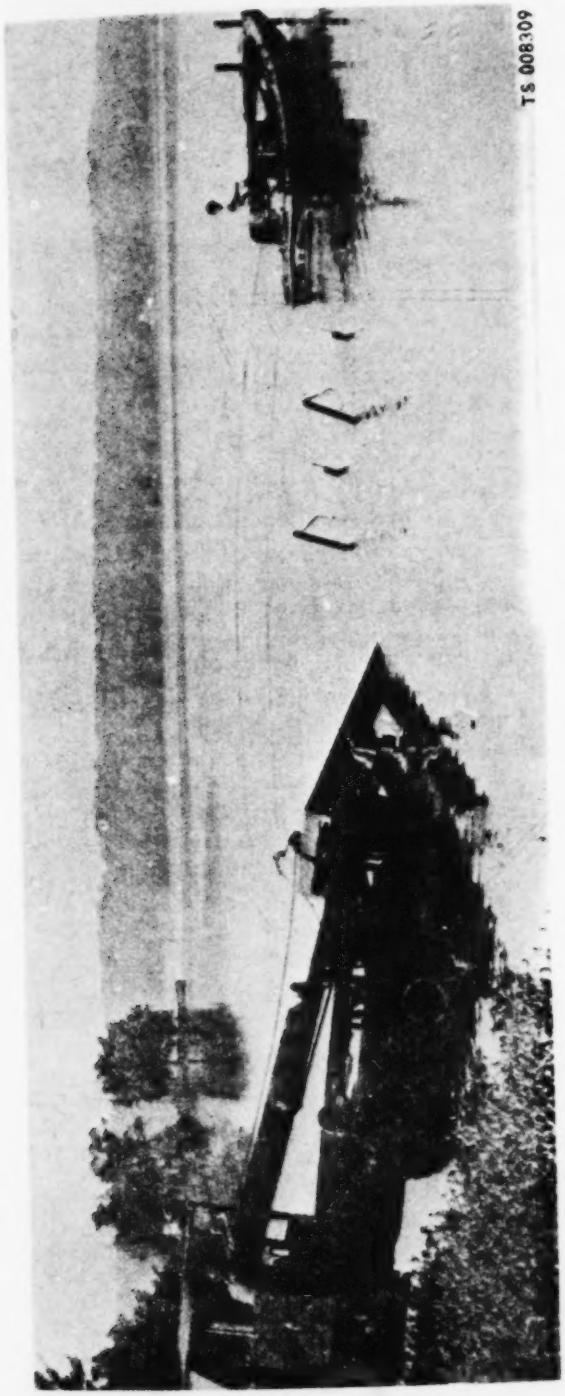


Figure 2-9. The boat approaching for retrieval.

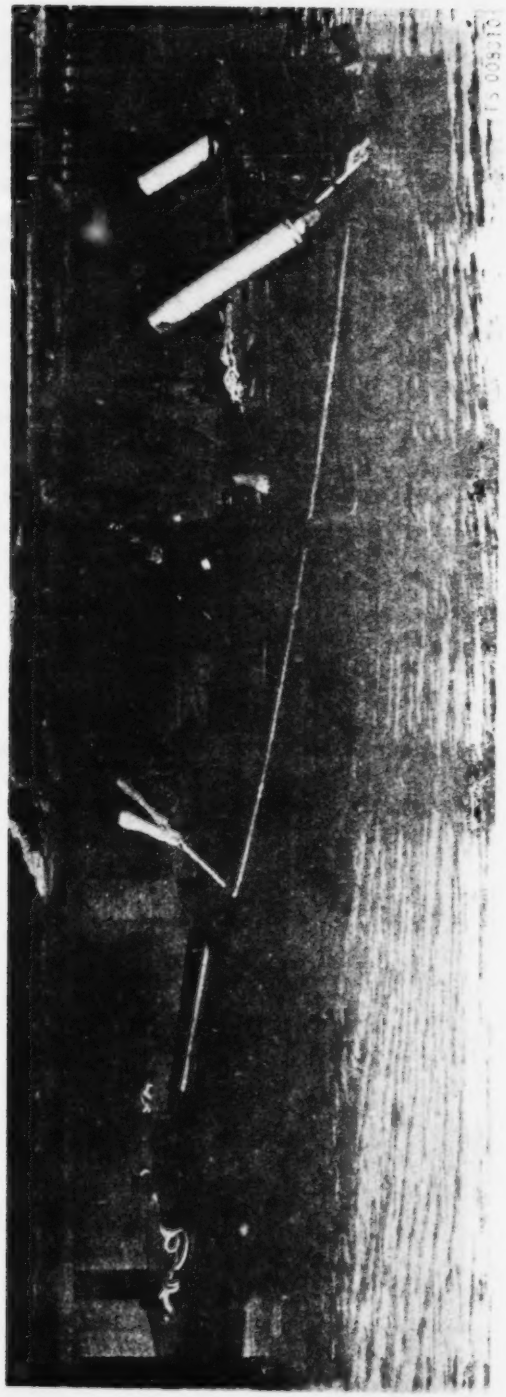


Figure 2-10. Securing the boat to docks for retrieval

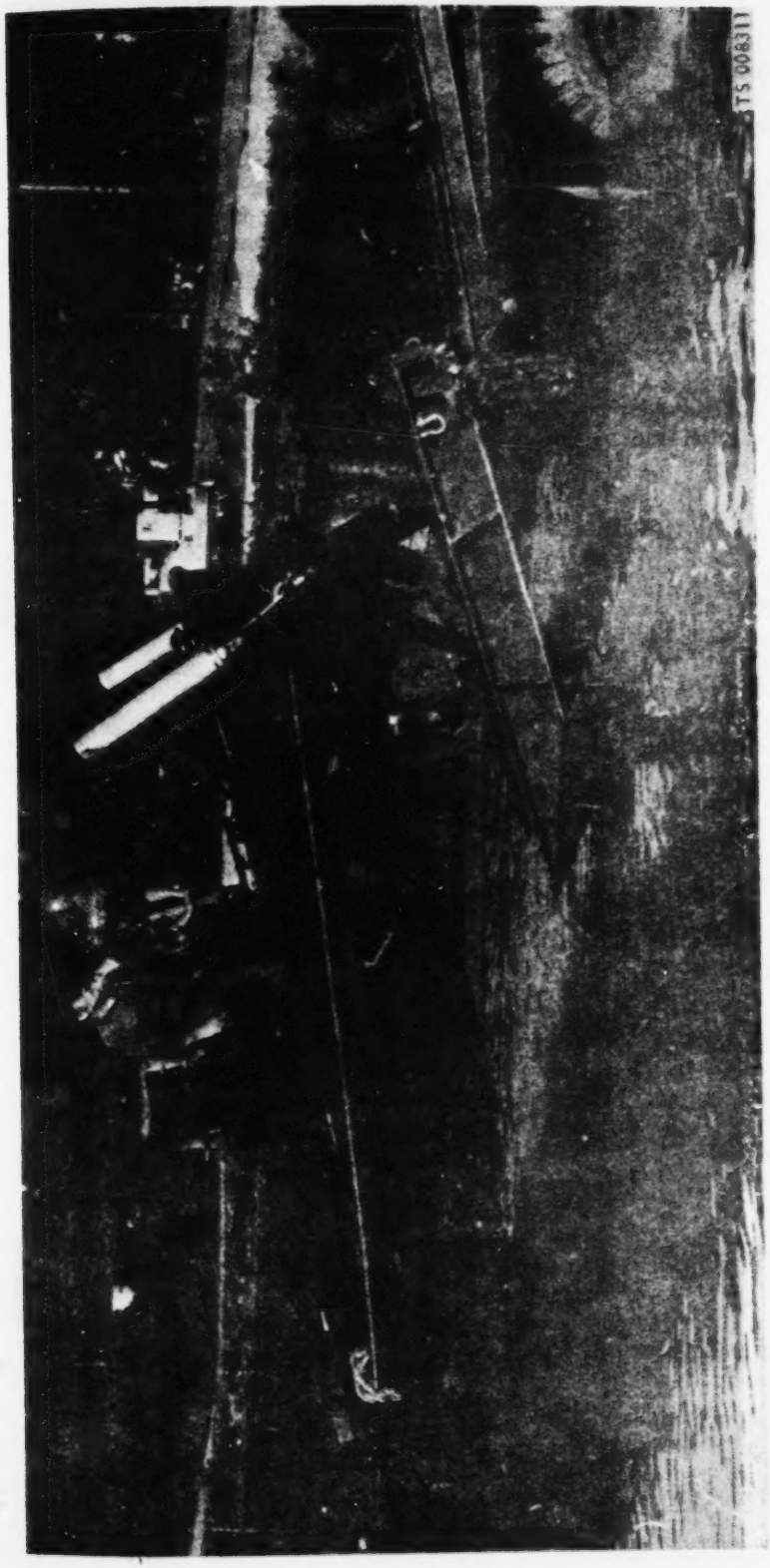


Figure 2-11. Retrieving the boat.

2-5. Unloading Boat and Boat Cradle

The rear winch and boom of the transporter can be used to unload the boat cradle onto a hardstand.

a. Prepare the transporter for unloading. Refer to paragraphs 2-3*e* and *f*.

b. Push the boom and winch hydraulic control levers to elevate the boom cable. Continue to slowly pay out the boom cable so that the boat cradle rolls downward over the rear support inboard rollers.

c. After the center of gravity passes the inboard rollers, adjust the boom elevation as needed to maintain alignment with the boat cradle and so that the bow of the boat does not contact the ground. Continue to pay out the boom cable and allow the boat cradle to descend toward the hardstand.

d. Allow the end of the boat cradle to come to rest on the hardstand. Use an assistant to pay out the boom cable as needed. Release the brake and slowly move the transporter forward as the assistant pays out the boom cable, so that the transporter rolls beneath the boat cradle until the forward cradle stop pins engage the stop brackets on the rear support inboard rollers. The transporter can be pushed forward on level ground by raising the boom.

e. The assistant will perform the following procedures:

(1) Elevate the boom to a vertical position, adjusting the boom cable as needed.

(2) Rewind the boom cable slightly, so that the dolly end of the boat cradle is raised enough to allow the stop pins to clear the stop brackets.

f. Move the transporter forward about two feet, stop the transporter, place the transmission in neutral, and lock the service brakes.

g. Extend the boom to maximum, so that the end of the boat cradle will clear the rear support of the transporter.

h. Pay out the boom cable until the dolly end of the boat cradle rests on the hardstand. Pay out enough slack so that the boom cable can be disconnected from the boat cradle.

i. Lift and secure the latch hook in the unlatched position. Remove the bridge pin retainer from the latch block retaining screw. Remove the screw and latch block.

j. Disengage the hook from the dolly, pull the cable and hook through the hole in the dolly beam, and lift the cable off of the sheave.

k. Reinstall the latch block, retaining screw, and bridge pin retainer. Release and relatch the latch hook.

l. Rewind the boom cable, retract the boom, disengage the hand throttle, depress the clutch, lift the control lever to disengage the power take-off, select the proper range for the transfer case, and move the transporter to the next worksite as described in TM 9-2320-260-10.

Section II. OPERATION UNDER UNUSUAL CONDITIONS

2-6. Operation in Extreme Cold

a. Extra care should be taken in loading, unloading, launching and retrieving the Boat Cradle in snow or icy conditions. Remove ice and snow from the Cradle before operation.

b. Lubricate the cradle for cold weather conditions in accordance with LO 5-2090-200-12.

2-7. Operation in Extreme Heat

Lubricate the cradle for hot weather conditions in accordance with LO 5-2090-200-12.

2-8. Operation in Salt Water Areas

a. General. Operation in salt water requires special precautions due to the extremely corrosive actions that are encountered. Rust and corrosion formation are greatly accelerated in a salt water environment. The cradle should be hosed down with fresh water when removed from salt water. Signs of corrosion and bare spots in painted surfaces should be corrected and repainted as soon as practicable.

b. Lubrication. Lubricate the cradle for operation in salt water in accordance with LO 5-2090-200-12.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION

3-1. General Lubrication Information

a. This section contains the lubrication chart and lubrication instructions which are supplemental to, and not specifically covered in the lubrication chart.

b. The lubrication chart shown in figure 3-1 is the approved lubrication chart for the cradle.

3-2. Detailed Lubrication Information

a. Care of Lubricants. Keep all lubricants, grease and oil, in closed containers and store in a clean, dry place away from external heat. Allow no dirt, dust, water or other foreign material of any kind to mix with the lubricants.

b. Points of Lubrication. Refer to figure 3-1 for illustration of lubrication points.

c. Cleaning. Keep all external parts not requiring lubrication clear of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all the lubrication points after lubricating to prevent accumulation of foreign matter.

LUBRICATION CHART

CRADLE, BOAT, 27 FT; BRIDGE ERECTION BOAT

NSN2090-00-348-8138

Intervals are based on number of launchings. Adjust to compensate for abnormal operation or severe conditions or contaminated lubricants. During inactive periods, sufficient lubrication must be performed for adequate preservation.

Clean fitting before lubricating.
* The time specified is the time required to perform all services at the particular interval.

Clean parts with solvent, dry cleaner P-D-680. Dry before lubricating.

Lubricate points indicted by dotted arrow shaft on both sides of equipment.

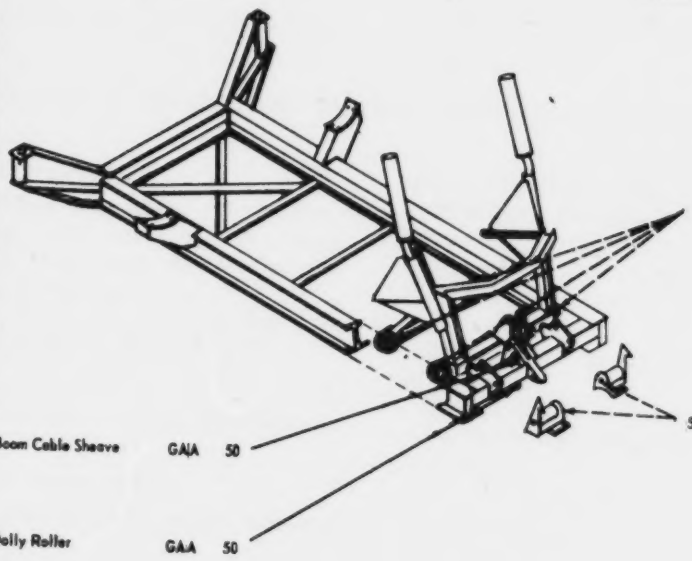
* TOTAL MAN-HR	
INTERVAL	MAN-HR
50 launchings	0.1

FOLD

FOLD

LUBRICANT ● INTERVAL

INTERVAL ● LUBRICANT



50 GAA Grease lubrication fitting of the four dolly wheels

50 GAA Grease each inboard roller

Boom Cable Sheave GAA 50

Dolly Roller GAA 50

Figure 3-1 (1)

TS 008312

Figure 3-1. Lubrication chart. (Sheet 1 of 2)

-KEY-

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURES			INTERVALS
		Above +32°F Above 0°C	+40°F to -10°F +5°C to -23°C	0°F to -65°F -18°C to -50°C	
GAA-GREASE Automotive & Artillery		ALL TEMPERATURES			Intervals given are in number of launchings.
Cradle Guide Roller					
Dolly Wheels					
Boom Cable Sheave					
Inboard Roller Assembly					

1. WHEEL BEARINGS. At every depot overhaul clean and inspect all parts, replace damaged or worn parts, repack bearings, and reassemble.

2. LUBRICATION FITTINGS. Every 50 launchings a high pressure grease gun is used to lubricate.

FOLD FOLD

Figure 3-1 (2) TS 008320

Figure 3-1. Lubrication chart (Sheet 2 of 2).

Section II. PREVENTIVE MAINTENANCE

3-3. General

To insure that the boat cradle is ready for operation at all times, you must inspect it systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed by you are listed in table 3-1. The sequence number indicates the order in which you should perform the preventive maintenance checks and services. You shall record all deficiencies together with the corrective action taken on DA Form 2404 (Equipment Inspection and Maintenance Worksheet).

3-4. Preventive Maintenance Checks and Services

Refer to table 3-1 for a listing of operator/crew preventive maintenance checks and services.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services

D—Daily
Time required: 0.6

W—Weekly
Time required:

Interval and sequence no.		Item to be inspected procedure	Work time (M/H)
D	W		
1		Inspect the boat cradle for damaged or missing components before and after each operation. If any cradle components are missing or damaged, notify organizational maintenance.	0.3
2		Inspect rope and cable assemblies for excessively worn or damaged ropes and cables. Report worn or damaged ropes and cables to organizational maintenance.	0.2
3		Inspect the boat cradle for excessively worn or loose rubber pads. Report loose or worn pads to organizational maintenance.	0.1

Section III. TROUBLESHOOTING

3-5. General

a. This section contains troubleshooting information for locating and correcting troubles which develop in the boat cradle. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. You should perform the tests, inspections, and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

3-6. Operator/ Crew Maintenance Troubleshooting

For operator/crew maintenance troubleshooting, refer to table 3-2.

Table 3-2. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. DOLLY BINDS OR WILL NOT TRAVEL
Step 1. Check for released latch hook.
Pull push-pull cable T-handle to release latch hook.
Step 2. Check the tie-down cable assemblies to see if they are connected.
Remove tie-down cable assemblies.
a. Grasp the turnbuckle handle and turn in a counterclockwise direction until cable is loose.
b. Pull tie hook up and free of the top edge of dolly.
c. Remove the cable assembly.
2. LATCH RELEASES OR FAILS TO ENGAGE
Step 1. Check for debris in latching mechanism.
Remove debris.
Use a stiff brush or pointed tool and remove debris between the hook latch and link or link clevis.
Step 2. Check if latch hook is engaged to the latch block.
Re-engage the latch.
Push the push-pull cable T-handle in, into engaged position.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

4-1. Inspecting and Servicing the Equipment

a. Inspection.

(1) Inspect for missing components and loose or missing parts and hardware.

(2) Inspect for dents, cracks, and other damage that may have occurred during shipment.

(3) Inspect for worn or damaged ropes and cables.

b. Service.

(1) Replace missing, worn, or damaged parts and components.

(2) Lubricate per LO 5-2090-200-12.

4-2. Unloading the Equipment

The rear winch and boom on the transporter can be used to unload the boat cradle.

a. Prepare the transporter for unloading the cradle.

(1) Apply the transporter service brakes, place transmission in neutral position, lock the service brakes, depress the control lever to engage the boom winch drive, and release the clutch pedal.

(2) Set the hand throttle so the engine operates at 1,800 RPM.

(3) Engage the hydraulic control lever, (fig. 2-4) to disengage the boom-point lock pin.

b. Push the boom and winch hydraulic control levers to elevate the boom to an angle of about 20 degrees and pay out the boom cable. Continue to slowly pay out the boom cable so that boat cradle rolls downward over the rear support inboard rollers.

c. After the center of gravity passes the inboard rollers, adjust the boom elevation as needed to maintain alignment with the boat cradle. Continue to pay out the boom cable and allow the boat cradle to descend toward the hardstand.

d. Allow the end of the boat cradle to come to rest on the hardstand. Use an assistant to pay out the boom cable as needed. Release the brake and slowly move the transporter forward as the assistant pays out the boom cable, so that the transporter rolls beneath the boat cradle until the forward cradle stop pins (13, fig. 1-1) engage the stop brackets on the rear support inboard rollers (fig. 2-4).

e. The assistant will then elevate the boom to a vertical position and rewind the boom cable slightly, so that the end of the boat cradle is raised enough to allow the stop pins to clear the stop brackets.

f. Move the transporter forward two feet, place in neutral and lock brakes then extend the boom to maximum, so the end of cradle will clear the transporter.

Section II. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

4-3. Tools and Equipment

There are no tools or special equipment authorized for the boat cradle.

4-4. Special Tools and Equipment

No special tools or equipment are required by organizational maintenance for the maintenance of the boat cradle.

4-5. Repair Parts and Equipment

Repair parts and equipment are listed and illustrated in the repair parts and special tools list covering organizational maintenance for this equipment in Appendix C of this manual.

Section III. LUBRICATION INSTRUCTIONS

4-6. General

This section contains supplemental information and lubrication instructions that must be followed for lubricating and servicing the boat cradle at organizational maintenance level. Refer to the lubrication chart (fig. 3-1), for lubrication points, intervals, and detailed instructions.

4-7. Special Lubrication Instructions

a. Dolly. There is a lubrication fitting on each of the four dolly wheels and each of the two transporter rear support inboard rollers. A high pressure grease gun is used to lubricate these wheels and rollers.

b. Cradle. The boom cable sheave and the cradle guide roller on the dolly end of the boat cradle have bearings that were packed with grease during initial assembly. When relubrication is needed, the sheave and the guide roller must be disassembled and repacked.

Section IV. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-8. General

This section lists the preventive maintenance checks and services which shall be performed on a monthly or quarterly basis by organizational maintenance personnel. It includes and expands upon the preventive maintenance services performed by operator/crew maintenance and includes additional services which are allocated to organizational maintenance.

4-9. Preventive Maintenance Checks and Services

Refer to table 4-1 for a listing of the preventive maintenance checks and services which are allocated to organizational maintenance.

Table 4-1. Organizational Preventive Maintenance Checks and Services

Q—Quarterly
Total man-hours required: 4.2

Sequence number	Item to be inspected procedure	Work time (M H)
1	CABLE AND ROPE ASSEMBLIES Inspect the boat cradle for excessively worn ropes, cables, and rope sleeves. Replace or repair excessively worn ropes, cables, and rope sleeves.	0.5
2	RUBBER PADS Inspect the cradle for excessively worn or loose rubber pads. Reattach rubber pads that have come loose from the metal mounting surface. Replace rubber pads that are worn to less than 0.25 inch thick, have gouges of sufficient number and depth to make it difficult to slide the boat over the pads, or have rips exceeding 3 inches in length.	1.0
3	CRADLE FRAME Inspect the cradle frame for cracks, dents, or other damage. Repair damaged frame.	0.5
4	CRADLE GUIDE ROLLERS Inspect the cradle guide rollers for worn, missing, or damaged parts. Replace missing worn or damaged parts.	0.6
5	DOLLY ASSEMBLY Inspect the dolly assembly for worn, bent, or damaged roller axle. Check for missing or loose hardware and parts. Replace a badly damaged or worn axle, replace missing parts and hardware. Tighten loose parts or hardware.	1.0
6	LATCH HOOK Check the latch hook for damaged, worn or missing parts. Replace damaged, worn or missing parts.	0.5
7	PUSH-PULL CABLE ASSEMBLY Check the cable assembly for damage, and missing or loose attaching hardware.	0.1

Section V. TROUBLESHOOTING

4-10. General

a. This section contains organizational maintenance troubleshooting for locating and correcting most of the operating troubles which may develop in the lubricating and servicing unit. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. Only those functions which are solely within the scope of organizational maintenance are listed. For troubleshooting procedures which are within the scope of operator/crew maintenance, refer to paragraph 3-6.

4-11. Organizational Maintenance Troubleshooting Chart

Refer to table 4-2 for troubleshooting which is allocated organizational maintenance levels.

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

Table 4-2. Organizational Maintenance Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. DOLLY BINDS OR WILL NOT TRAVEL
Step 1. Check for released latch hook.
Pull push-pull cable T-handle to release latch hook.
Step 2. Check the tie-down cable assemblies to see if they are connected.
Remove tie-down cable assemblies.
a. Turn the turnbuckle handle in a counter-clockwise direction until the cable is loose.
b. Pull tie hook up and free of the top edge of dolly.
c. Remove the cable assembly.
Step 3. Check for debris wedged between dolly wheels and beams or rails.
Remove debris.
Use a stiff brush or pointed tool and remove debris between the dolly wheels and beams or rails.
Step 4. Check for seized dolly wheel.
Lubricate dolly wheel. If this does not free the wheel, remove and repair or replace as needed (para 4-18).
Lubricate dolly wheel. If this does not free the wheel, remove and repair or replace as needed (para 4-18).
2. LATCH RELEASES OR FAILS TO ENGAGE
Step 1. Check for broken push-pull cable.
Replace cable (para 4-19).
Step 2. Check for debris in latching mechanism.
Remove debris.
Use a stiff brush or pointed tool and remove debris between the hook latch and link or link clevis.
Step 3. Check for broken or missing spring.
Replace spring (para 4-20).
Step 4. Check for worn or damaged latch hook.
Replace latch hook (para 4-20).
Step 5. Check for worn or damaged latch block.
Replace latch block (para 4-20).

Section VI. MAINTENANCE OF THE CRADLE ASSEMBLY

4-12. General

The cradle assembly consists of an aluminum cradle frame, four guide stanchions, two lashing ropes, eight tie-down cables, access cover and rubber pads.

4-13. Cable Assembly

a. Removal.

(1) Remove pin (2, fig. 4-1) and remove cable (1) with tie-down hook (6) attached.

(2) Remove pins (8-12 and 42) and remove cables (7, 11 and 45).

(3) Refer to figure 4-2 and remove cable lashing assemblies.

b. Cleaning, inspection and repair.

(1) Inspect all cables for wear, breaks, and damage. Inspect for missing, worn or damaged hardware.

WARNING

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100° F. -- 138° F. (38° C. — 59° C.).

(2) Clean cables and hardware with dry cleaning solvent (Fed. Spec P-D-680).

(3) Replace any damaged or worn cables. Replace missing or damaged hardware.

c. Installation.

(1) Install cables (1, 7, 11 and 45) and secure with pins (2, 8, 12 and 42).

(2) Refer to figure 4-2 and install cable lashing assemblies.

Key to figure 4-1

1 Tie down cable
2 Pin
3 Wire rope
4 Sleeve
5 Shackle
6 Hook
7 Tie down cable
8 Pin
9 Wire rope
10 Sleeve
11 Tie down cable
12 Pin
13 Wire rope
14 Sleeve
15 Pin
16 Washer
17 Cotter pin
18 Shackle
19 Screw pin shackle
20 Lashing cable
21 Lashing cable
22 Identification plate
23 Rivet
24 Access cover
25 Capscrew
26 Lockwasher
27 Washer
28 Shackle
29 Shackle
30 Pin
31 Wire rope
32 Sleeve
33 Cradle stanchion
34 Boat guide stanchion
35 Pin
36 Wire rope
37 Sleeve
38 Screw
39 Nut
40 Shackle
41 Rope
42 Pin
43 Wire rope
44 Sleeve
45 Cable

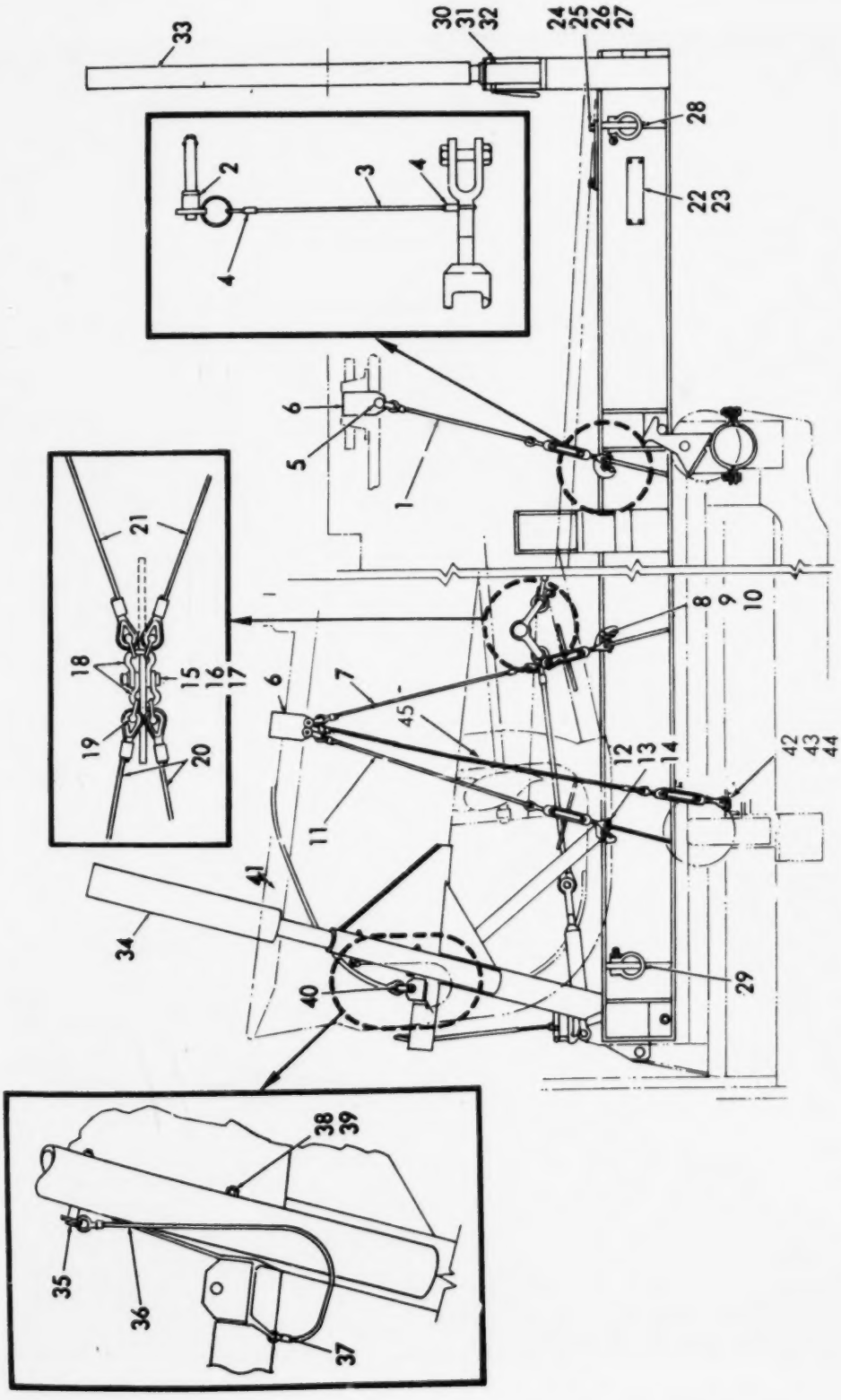


Figure 4-1. Cradle assembly.

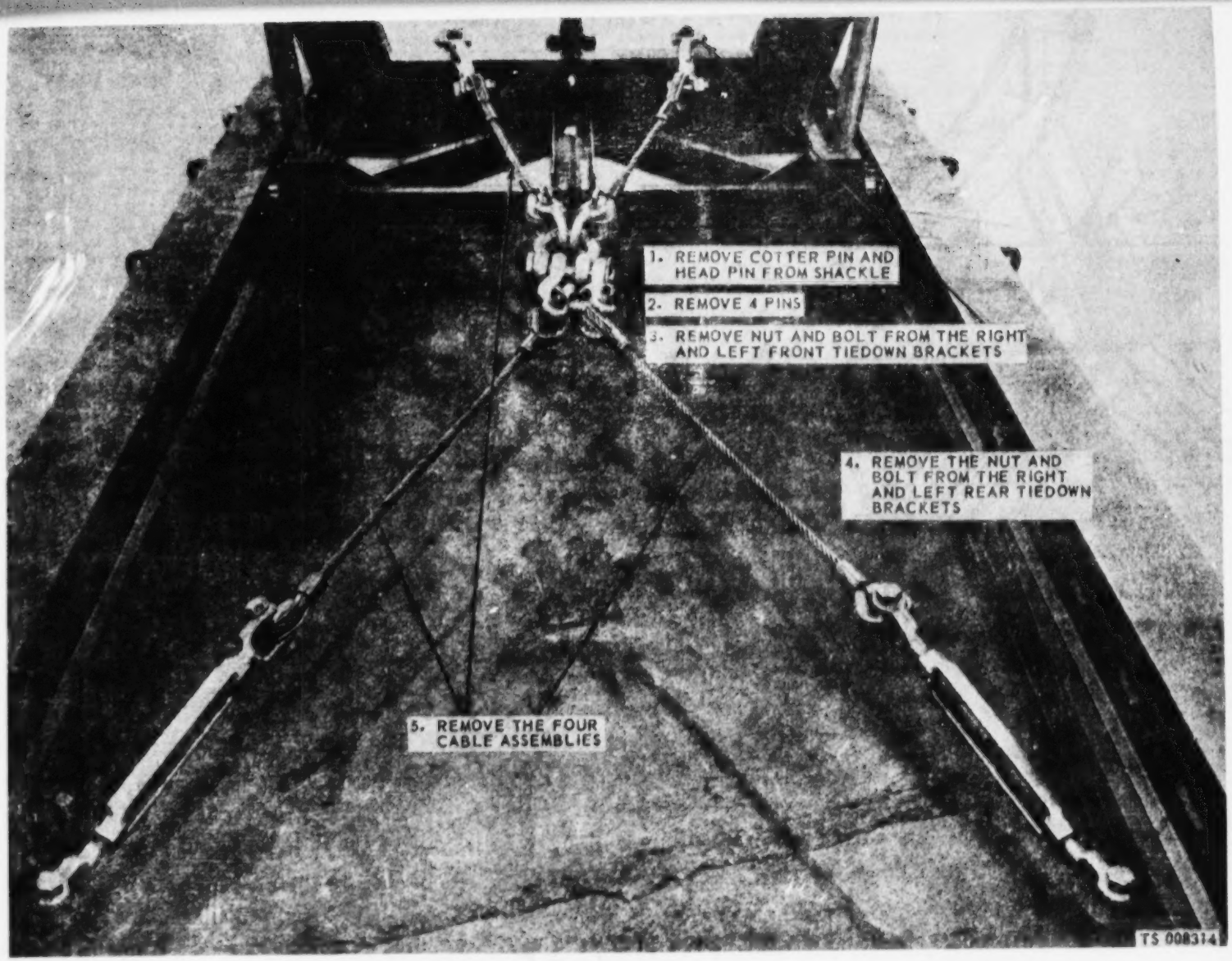

1. REMOVE COTTER PIN AND HEAD PIN FROM SHACKLE
2. REMOVE 4 PINS
3. REMOVE NUT AND BOLT FROM THE RIGHT AND LEFT FRONT TIEDOWN BRACKETS
4. REMOVE THE NUT AND BOLT FROM THE RIGHT AND LEFT REAR TIEDOWN BRACKETS
5. REMOVE THE FOUR CABLE ASSEMBLIES
TS 008314

Figure 4-2. Cable lashing assembly.

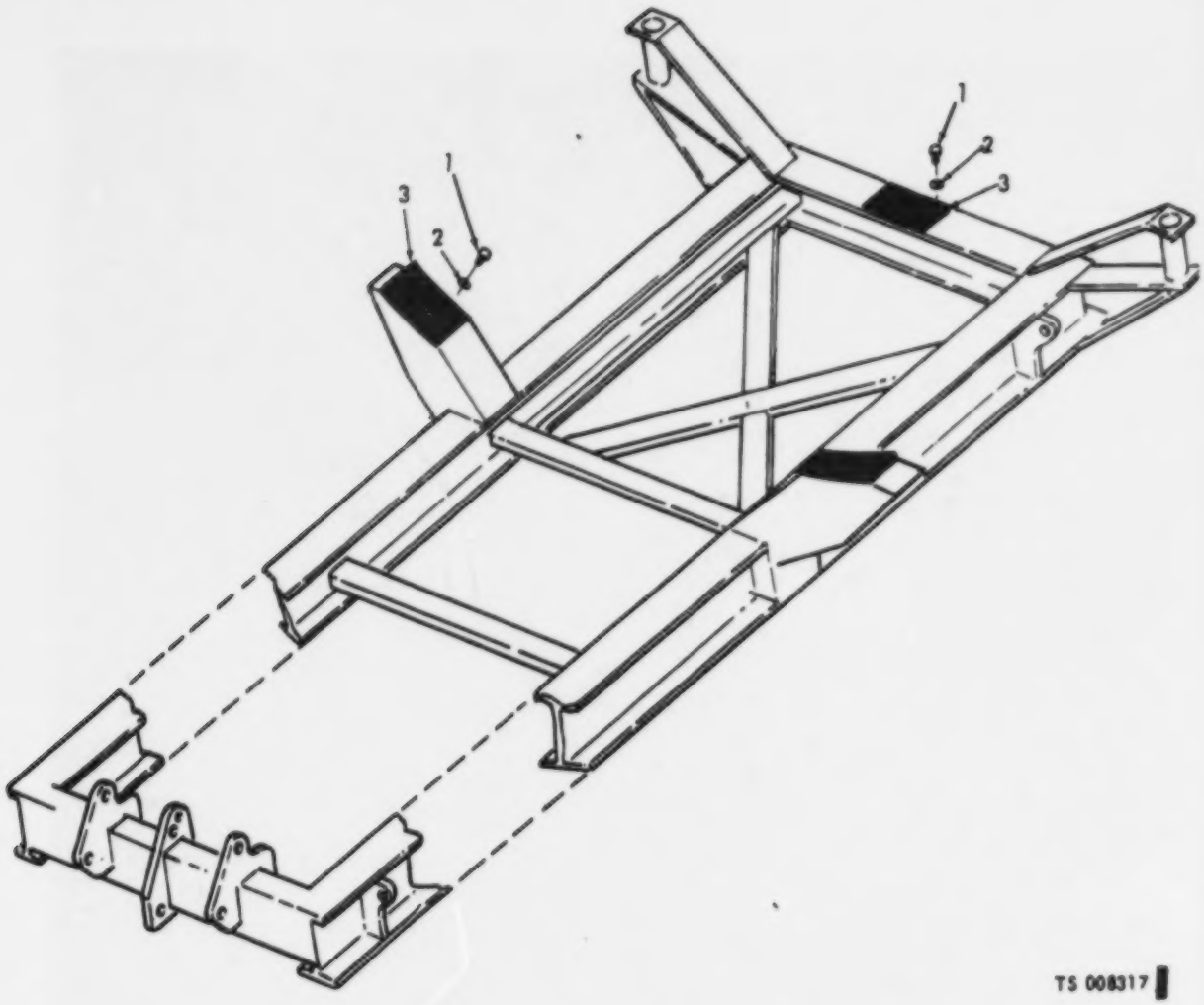


Figure 4-2.1. Cradle and dolly assemblies (Sheet 1 of 2).

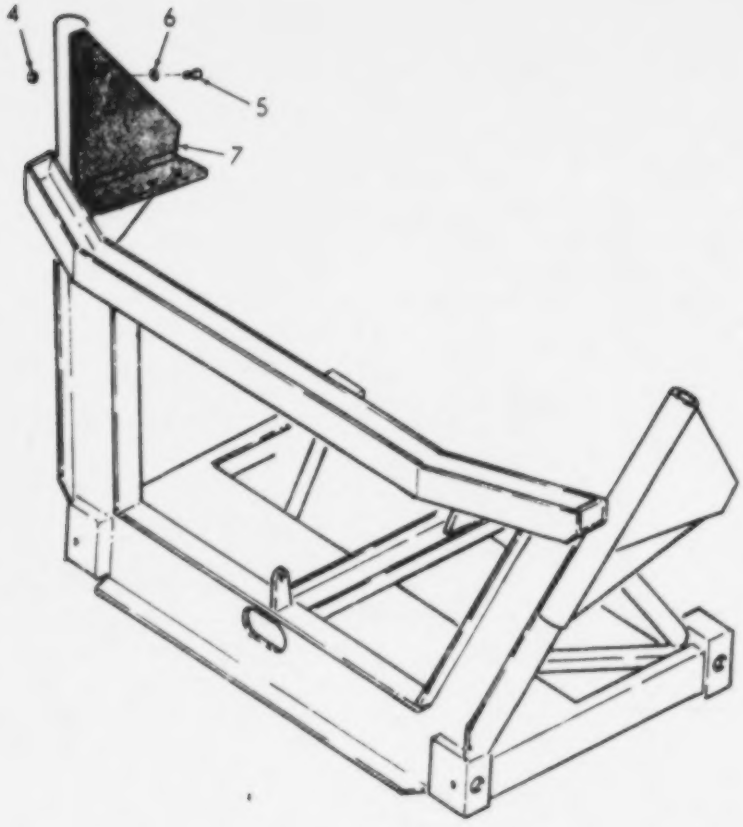
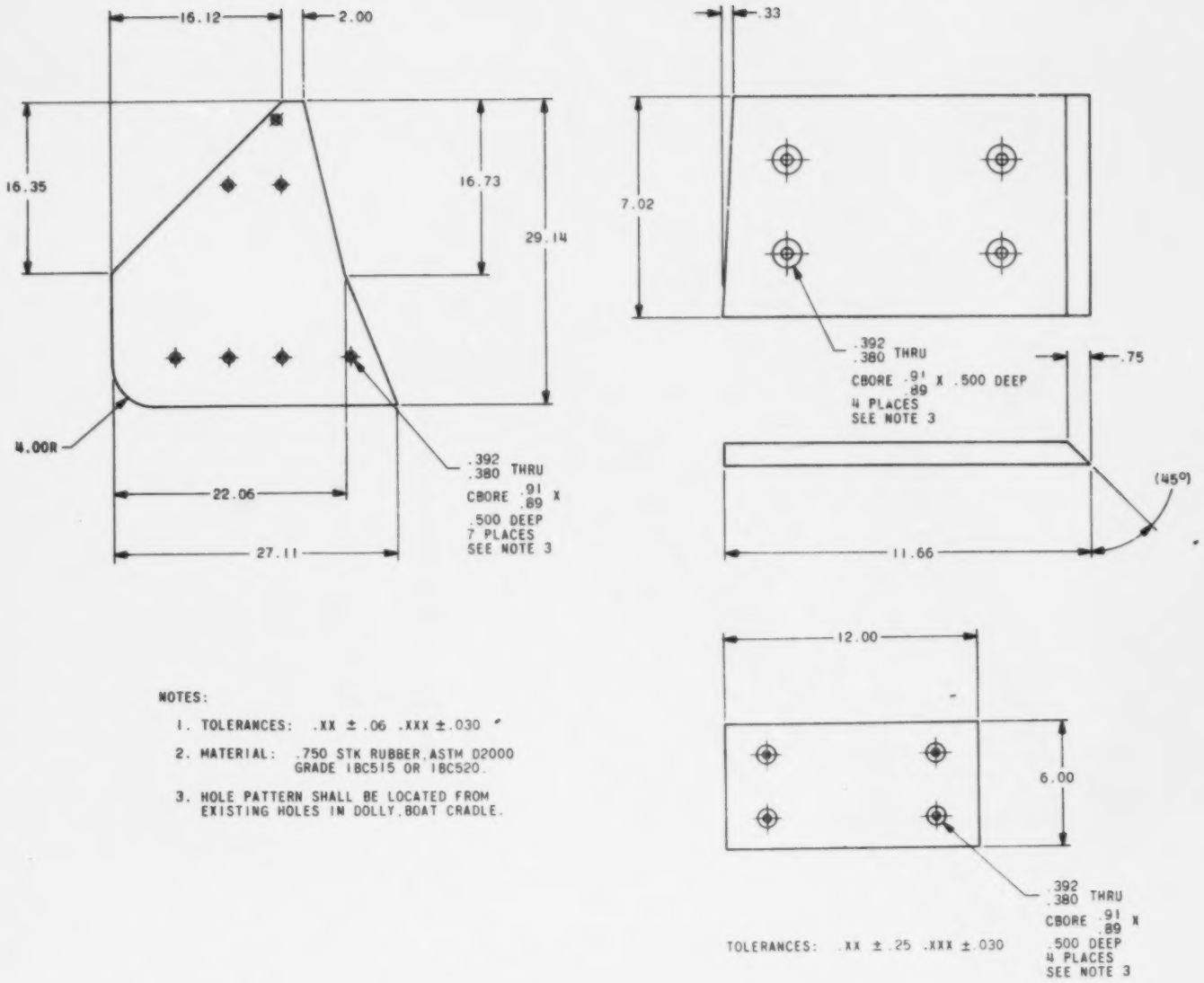


Figure 4-2.1. Cradle and dolly assemblies (Sheet 2 of 2).



NOTES:

1. TOLERANCES: .XX ± .06 .XXX ± .030
2. MATERIAL: .750 STK RUBBER, ASTM D2000 GRADE 1BC515 OR 1BC520.
3. HOLE PATTERN SHALL BE LOCATED FROM EXISTING HOLES IN DOLLY, BOAT CRADLE.

TOLERANCES: .XX ± .25 .XXX ± .030

Figure 4-2.2. Rubber pads.

4-14. Roller Assembly

a. Removal.

(1) Remove the spiral retaining ring (1, fig. 2-5) from the axle (2).

(2) Push the axle (2) through the housing.

(3) Remove the roller (3).

b. Cleaning and inspection.

(1) Inspect the roller assembly for worn or missing parts. Inspect for excessive damage.

WARNING

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100° F. — 138° F. (38° C. — 59° C.).

(2) Clean the roller with a dry cleaning solvent (Fed. Spec. P-D-680) and dry thoroughly.

(3) Replace any worn or missing parts. Replace an excessively damaged roller assembly.

c. Installation.

(1) Place the roller (3) in position to the housing.

(2) Install the axle (2) into the housing.

(3) Install the spiral retaining ring (1) on the axle (2).

4-15. Sheave

a. Removal.

(1) Remove the spiral retaining ring (5, fig. 2-5) from the axle (6).

(2) Push the axle (6) through the housing.

(3) Remove the sheave (7) and bearing (8).

b. Cleaning and Inspection.

WARNING

Dry cleaning solvent, P-D-680 or P-S-661, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100° F. — 138° F. (38° C. — 59° C.).

(1) Clean the sheave with cleaning solvent (Fed. Spec. P-D-680).

(2) Inspect the sheave for wear and damage.

(3) Replace any worn or damaged parts.

c. Installation.

(1) Place the sheave (7) with bearing (8), in position and install axle (6) into the housing.

(2) Install the spiral retaining ring (5) on the axle (6).

4-16. Rubber Pads

a. Removal.

(1) Remove screw (1, fig. 4-2.1) and washer (2), from pad (3) and nut (4), screw (5), and washer (6) from pad (7).

(2) Strip the pad from the mounting surface.

b. Cleaning, inspection and repair.

(1) Inspect for excessively worn or loose rubber pads. Check for gouges and rips in pads. When pad is removed, clean the mounting surface of old adhesive.

(2) Replace a pad that is worn to less than 0.25 inch thick, have gouges of sufficient number and depth to hamper boat from sliding over pads, or have rips exceeding 3 inches.

c. Installation.

(1) Refer to figure 4-2.2 and cut a new pad.

(2) Drill and countersink holes in the new pad as shown in figure 4-2.2.

(3) Clean the mounting surface and bonding surface of the rubber pad with trichloroethylene.

(4) Bond the rubber pad to the mounting surface with oil-resistant polychloroprene rubber base adhesive conforming to MMM-A-1617, Type II. Apply the adhesive in accordance with the manufacturer's instructions.

(5) Secure the pads (3 and 7) by installing screws (1 and 5), washers (2 and 6) and nut (4).

Section VII. MAINTENANCE OF THE DOLLY ASSEMBLY

4-17. General

The dolly assembly rides on the cradle frame and supports the Bridge Erection boat. It permits the boat to slide back and forward to aid in launching and retrieving. The dolly supports the boat with the help of two attached stanchions and rides the frame on four wheels that are locked into the cradle frame.

4-18. Dolly Assembly

a. Removal.

(1) Remove the capscrews (25, fig. 4-1), lockwashers (26), flat washers (27), and access covers (24).

(2) Unlatch the dolly (8, fig. 1-1) and move it so that the two wheels line up with the access cutouts.

(3) Pivot the dolly upward so that two wheels are listed through the access cutouts and clear of the side beams.

(4) Move the dolly so that the remaining two wheels line up with the access cutouts.

(5) Lift the dolly so that the remaining two

wheels are listed through the access cutouts and clear of the side beams.

b. Disassembly.

(1) Set the dolly on blocks or dunnage.

(2) Slide the wheels off of the axles.

(3) Remove the capscrews, lockwashers and flat washers and slide the axles from their housings.

c. Cleaning and Inspection.

(1) Inspect the dolly for cracks, dents, or other damage and for missing or damaged parts.

(2) Remove dirt, grease or oil from the dolly.

(3) Replace any missing or damaged parts.

d. Reassembly.

(1) Install the axle in the dolly housing and secure with the capscrew, lockwasher and flat washer.

(2) Slide the wheels on the axle until secure.

e. Installation.

(1) Remove the access covers and lower the two front dolly wheels through the access cutouts.

(2) Move the dolly so that the remaining two wheels line up with the access cutouts and lower the wheels through the cutouts.

(3) Install the access cover and secure with capscrew, lockwasher and flat washer.

4-19. Push-Pull Release Cable

a. Removal.

(1) Remove cotter pin (12, fig. 2-5) and cable stop (13).

(2) Remove four nuts (1, fig. 4-3), lockwasher (2) and screws (3) from clamp (4). Remove two nuts (5), washer (6), and screws (7) and remove the cable clamps (4 and 8).

(3) Remove screws (10), nuts (14), washers (15), and clamps (11).

(4) Remove screw (9) and clamp (11) and remove the push-pull release cable (12).

b. Cleaning and Inspection.

(1) Inspect the push-pull release cable for damage, wear, and missing parts.

WARNING

Dry cleaning solvent, P-D-680 or P-S-661, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 F. — 138 F. (38 C. — 59 C.).

(2) Clean the push-pull release cable with cleaning solvent (Fed. Spec. P-D-680) and dry thoroughly.

c. Installation.

(1) Place the push-pull release cable (12) in position and secure it at the top with clamp (11) and screw (9).

(2) Secure the center of the cable with clamps (11), nuts (14), and washers (15).

(3) Secure the cable at the bottom by installing clamps (4 and 8). Install clamp (8) with nuts (5), washers (6), and screws (7). Install clamp (4) with nuts (1), lockwasher (2) and screws (3).

(4) Attach the cable at the bottom to the latch assembly (fig. 2-5) with the cable stop (13, fig. 2-5) and cotter pin (12).

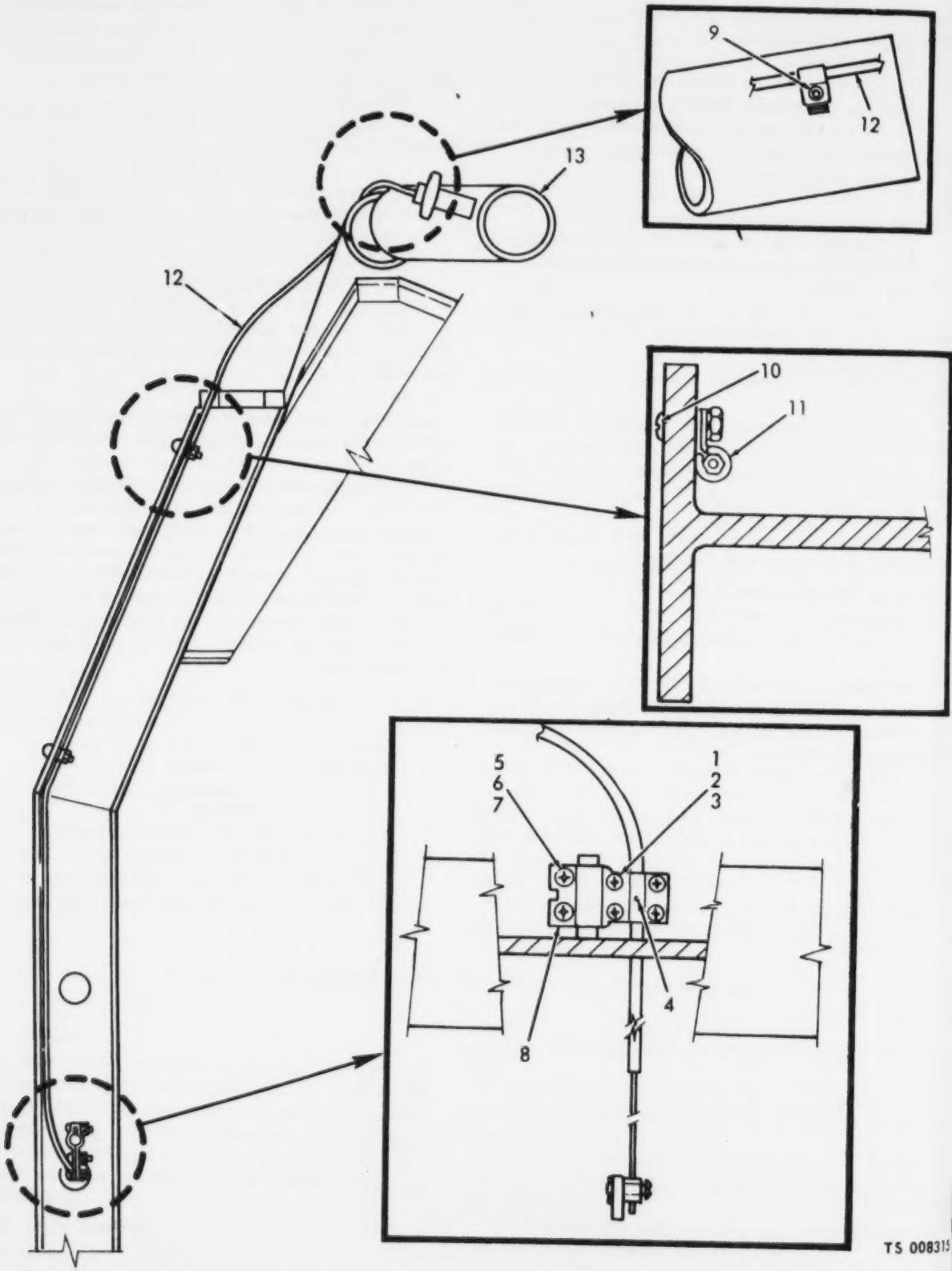


Figure 4-3. Push-pull release cable.

Key to figure 4-3.
1. Nut
2. Lockwasher
3. Screw
4. Clamp
5. Nut
6. Lockwasher
7. Screw
8. Clamp
9. Screw
10. Screw
11. Clamp
12. Push-pull cable
13. Stanchion
14. Nut
15. Lockwasher

4-20. Latch Assembly

a. Removal.

(1) Disconnect the push-pull cable at the latch.

(2) Remove the latch spring (21, fig. 2-5).

(*a*) Seat the latch hook (18) on the latch block (11), to steady the latch hook while removing spring.

(*b*) Remove the cotter pin (14), flat washer (15), and pin (17), from the clevis link (19) connection to the latch hook (18).

(*c*) Lift the link (20) and clevis link (19) to clear the latch spring (21).

(*d*) Compress and remove the latch spring.

(3) Remove the latch hook (18).

(*a*) Remove the cotter pin (14), flat washer (15), and pin (17) from the latch hook (18) connection to the bracket on the dolly beam.

(*b*) Remove the latch hook (18).

(4) Remove the latch block (11).

(*a*) Remove the bridge pin retainer (9), and capscrew (10), from the latch block (11).

(*b*) Remove the latch block (11).

b. Cleaning and Inspection.

(1) Inspect the latch assembly for missing or worn parts. Check the latch for cracks, breaks, or other damage.

WARNING

Dry cleaning solvent, P-D-680 or P-S-661, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 F. — 138 F. (38 C. — 59 C.).

(2) Clean the latch assembly with dry cleaning solvent (Fed. Spec. P-D-680) and dry thoroughly.

(3) Replace any missing or damaged parts.

c. Installation. Install the latch assembly in reverse order of removal.

Section VIII. MAINTENANCE OF THE ROLLER ASSEMBLY

4-21. General

The boat cradle comes equipped with two roller assemblies for installation on the transporter. The boat cradle rides on the roller assemblies during launching and retrieving. There is a right hand roller assembly and a left hand. The two assemblies are identical except one is the reverse of the other.

4-22. Roller Assembly

a. Removal.

(1) Remove four mounting nuts (1, fig. 4-4), lockwashers (2), flat washers (3), and capscrews (4).

(2) Remove the roller assembly and cap bracket (5) from the transporter.

(3) Remove the cotter pin (9), nut (10), washer (11), axle (13), and washer (14).

(4) Remove the roller (15) from the right hand roller bracket (16). Use the same procedure to remove the left hand roller for bracket (17).

b. Cleaning and Inspection.

(1) Inspect the roller assembly for worn or missing parts and excessive damage.

WARNING

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 F. — 138 F. (38 C. — 59 C.).

(2) Clean the roller assembly parts with a dry cleaning solvent (Fed. Spec. P-D-680) and dry thoroughly.

(3) Replace any worn or missing parts. Replace an excessively damaged roller assembly.

c. Installation.

(1) Place the roller (15) in position in the right hand roller bracket (16) and secure with axle (13), washer (14), washer (11), nut (10) and cotter pin (9).

(2) Position the roller assembly and cap bracket (5) on the transporter and secure with four mounting nuts (1), lockwashers (2), flatwashers (3), and capscrews (4).

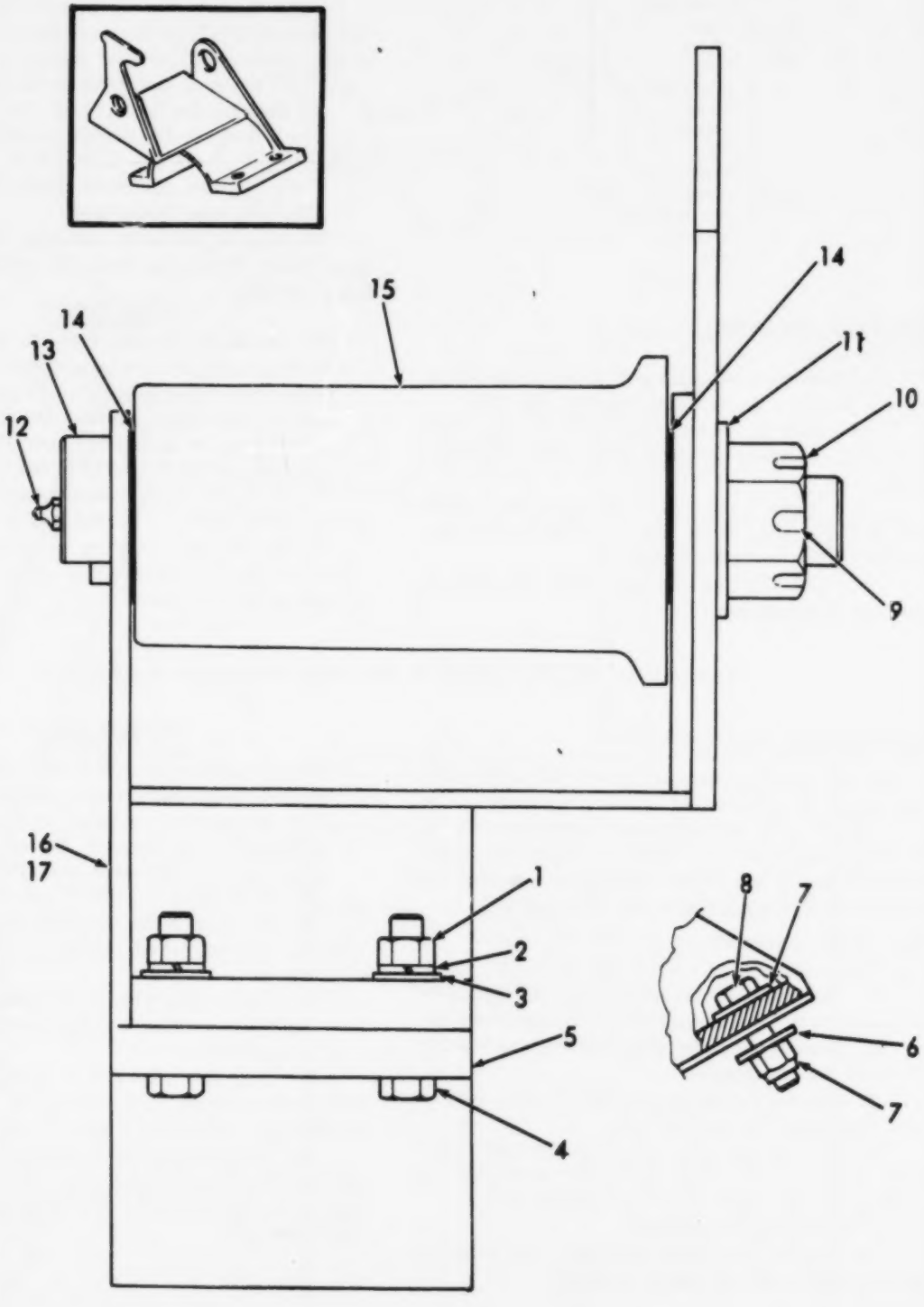


Figure 4-4. Roller assembly

Key to figure 4-4.
1 Nut
2 Lockwasher
3 Washer
4 Screw
5 Cap
6 Nut
7 Washer
8 Screw
9 Cotter pin
10 Nut
11 Washer
12 Lubrication fitting
13 Roller axle
14 Thrust washer
15 Roller
16 RH roller bracket
17 LH roller bracket

4-23. Cradle Support Assembly

Deleted.

APPENDIX A

REFERENCES

A-1. Lubrication	
C9100-IL	Identification List for Fuels, Lubricants, Oils and Waxes. End Item LO
A-2. Painting	
TM 43-0139	Painting Instructions for Field Use
A-3. Maintenance	
TM 3-875	The Army Maintenance Management System
TM 9-237	Welding Theory and Application
A-4. Shipment and Storage	
TM 740-90-1	Administrative Storage of USAMEC Mechanical Equipment
A-5. Destruction to Prevent Enemy Use	
TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibliity for the performance of maintenance functions on the identified end item or component and the work measurement time required to perform the functions by the designated maintenance level. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the tools and test equipment required for each maintenance function as referenced from Section II.

B-2. Explanation of Columns in Section II

a. Column (1). Group Number. Column 1 lists group numbers to identify related components, assemblies, subassemblies, and modules with their next higher assembly. The applicable groups are listed in the MAC in disassembly sequence beginning with the first group removed.

b. Column (2). Component/Assembly. This column contains the noun names of components, assemblies, subassemblies and modules for which maintenance is authorized.

c. Column (3). Maintenance Functions. This column lists the functions to be performed on the item listed in Column 2.

The maintenance functions are defined as follows:

(1) *Inspect.* To determine serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

(2) *Test.* To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

(3) *Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

(4) *Adjust.* To maintain within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

(5) *Align.* To adjust specified variable elements of an item to bring about optimum or desired performance.

(6) *Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

(7) *Install.* The act of emplacing, seating, or fixing into position an item, part or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

(8) *Replace.* The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

(9) *Repair.* The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly module (component or assembly), end item, or system.

(10) *Overhaul.* That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

(11) *Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those

age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

d. Column (4). Maintenance Category. This column is made up of subcolumns for each category of maintenance. Work time figures are listed in these subcolumns for the lowest level of maintenance authorized to perform the function listed in column 3. These figures indicate the average active time required to perform the maintenance function at the indicated category of maintenance under typical field operating conditions.

e. Column (5). Tools and Equipment. This column is provided for referencing by code, the common tool sets (not individual tools) special tools, test and support equipment required to perform the designated function.

B-3. Explanation of Columns in Section III

a. Column (1). Reference Code. This column consists of an arabic number listed in sequence from column 5 of Section II. The number references the common tool sets, special tools and test equipment requirements.

b. Column (2). Maintenance Category. This column shows the lowest category of maintenance authorized to use the special tools or test equipment.

c. Column (3). Nomenclature. This column lists the name or identification of the common tool sets, special tools or test equipment.

d. Column (4). National/Nato Stock No. (NSN). This column is provided for the NSN of common tool sets, special tools and test equipment listed in the Nomenclature Column.

e. Column (5). Tool Number. This column lists the manufacturer's code and part number of tools and test equipment.

(1) Group number	(2) Component assembly	(3) Maintenance function	(4) Maintenance category C	O	F	H	D	(5) Tools and equipment
01	CRADLE							
0101	Cable Assy, Quick Release Pins, Tie Down Hooks and Shackles	Inspect		0.1				
		Replace		1.0				
0102	Roller, Sheave, Block Latch	Inspect		0.1				
		Replace		0.5				
0103	Data Plate	Inspect		0.1				
		Replace		0.1				
0104	Access Cover, Boat Cradle Rail and Rubber Pads	Inspect		0.1				
		Replace		1.5				
02	DOLLY, BOAT CRADLE							
0201	Stanchion, Quick Release Pins, Shackles and Rope Assemblies	Inspect		0.1				
		Replace		0.4				
0202	Push-Pull Release Cable Brackets and Clamps	Inspect		0.1				
		Replace		0.2				
0203	Hook, Latch, Links and Spring	Inspect		0.1				
		Replace		0.2				
0204	Wheel Assy, Shaft, Thrust Washers and Cradle Stop Pin	Inspect		0.1				
		Service		0.1				
		Replace		0.3				
03	ROLLER AND AXLE ASSEMBLIES							
0301	Roller, Axle and Bracket	Inspect		0.1				
		Service		0.1				
		Replace		1.0				

*SUBCOLUMNS ARE AS FOLLOWS
F-DIRECT SUPPORT;
**INDICATES WT MH REQUIRED

C-OPERATOR CREW;
H-GENERAL SUPPORT;

O-ORGANIZATIONAL;
D-DEPOT

APPENDIX C

REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

C-1. Scope

a. This manual lists repair parts, special tools, test and support equipment required for the performance of organizational maintenance of the boat cradle.

b. Repair parts listed represent those authorized for use at the organizational level and will be requisitioned on an "as required" basis until stockage is justified by demand in accordance with AR 710-2.

C-2. General

This Repair Parts and Special Tools List is divided into the following sections:

a. Prescribed Load Allowance List—Section II. (Not applicable).

b. Repair Parts List—Section III. A list of repair parts authorized at the organizational level for the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of assembly groups in ascending numerical sequence, with the parts in each group listed in figure and item number sequence.

c. Special Tools List—Section IV. (Not applicable).

d. National Stock Number, Part Number, and Alphabetical Index—Section V. A list, in ascending numerical sequence, of all National Stock Numbers appearing in the listings, followed by a list, in alphanumeric sequence, of all part numbers appearing in the listings. National Stock Number and part numbers are cross-referenced to each illustration figure and item number appearance.

C-3. Explanation of Columns

The following provides an explanation of columns found in the tabular listings:

a. Illustration. This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number.* The number used to identify each item called out in the illustration.

b. Source, Maintenance, and Recoverability Codes (SMR).

(1) *Source code.* Source codes are assigned to support items to indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR code format as follows:

Code	*Definition*
PA	Item procured and stocked for anticipated or known usage.
PB	Item procured and stocked for insurance purpose because essentiality dictates that a minimum quantity be available in the supply systems.
PC	Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.
PD	Support item, excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent or additional issues or outfittings. Not subject to automatic replenishment.
PE	Support equipment procured and stocked for initial issue or outfitting to specified maintenance repair activities.
PF	Support equipment which will not be stocked but which will be centrally procured on demand.
PG	Item procured and stocked to provide for sustained support for the life of the equipment. It is applied to an item peculiar to the equipment which, because of probable discontinuance or shutdown of production facilities, would prove uneconomical to reproduce at a later time.
KD	An item of a depot overhaul/repair kit and not purchased separately. Depot kit defined as a kit that provides items required at the time of overhaul or repair.
KF	An item of a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.
KB	Item included in both a depot overhaul/repair kit and a maintenance kit.
MO	Item to be manufactured or fabricated at organizational level.
MF	Item to be manufactured or fabricated at the direct support maintenance level.
MH	Item to be manufactured or fabricated at the general support maintenance level.
MD	Item to be manufactured or fabricated at the depot maintenance level.
AO	Item to be assembled at organizational level.
AF	Item to be assembled at direct support maintenance level.
AH	Item to be assembled at general support maintenance level.
AD	Item to be assembled at depot maintenance level.

Code	*Definition*
XA	Item is not procured or stocked because the requirements for the item will result in the replacement of the next higher assembly.
XB	Item is not procured or stocked. If not available through salvage, requisition.
XD	A support item that is not stocked. When required, item will be procured through normal supply channels

NOTE

Cannibalization or salvage may be used as a source of supply for any items source coded above except those coded XA or XD.

(2) *Maintenance code.* Maintenance codes are assigned to indicate the levels of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(*a*) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to move, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code	*Application/Explanation*
C	Crew or operator maintenance performed within organizational maintenance.
O	Support item is removed, replaced, used at the organizational level.
I	Support item is removed, replaced, used by the direct support element of integrated direct support maintenance.
F	Support item is removed, replaced, used at the direct support level.
H	Support item is removed, replaced, used at the general support level.
D	Support items that are removed, replaced, used at depot, mobile depot, specialized repair activity only.

NOTE

Codes "I" and "F" will be considered the same by direct support units.

(*b*) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes:

Code	*Application/Explanation*
O	The lowest maintenance level capable of complete repair of the support item is the organizational level.
F	The lowest maintenance level capable of complete repair of the support item is the direct support level.
H	The lowest maintenance level capable of complete repair of the support item is the general support level.
D	The lowest maintenance level capable of complete repair of the support item is the depot level.
L	Repair restricted to designated specialized repair activity.
Z	Nonreparable. No repair is authorized.
B	No repair is authorized. The item may be reconditioned by adjusting, lubricating, etc., at the user level. No parts or special tools are procured for the maintenance of this item.

(3) *Recoverability code.* Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

Recoverability Code	*Definition*
Z	Nonreparable item. When serviceable, condemn and dispose at the level indicated in position 3.
O	Reparable item. When uneconomically reparable, condemn and dispose at organizational level.
F	Reparable item. When uneconomically reparable, condemn and dispose at the direct support level.
H	Reparable item. When uneconomically reparable, condemn and dispose at the general support level.
D	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.
L	Reparable item. Repair, condemnation, and disposal not authorized below depot/specialized repair activity level.
A	Item requires special handling or condemnation procedures because of specific reasons (i.e., precious metal content, high dollar value, critical material or hazardous material). Refer to appropriate manuals/directives for specific instructions.

c. National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

d. Part Number. Indicates the primary number used by the manufacturer which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

NOTE

When a stock numbered item is requisitioned, the repair part received may have a different part number than the part being replaced.

e. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the item. Items that are included in kits and sets are listed below the name of the kit or set with the quantity of each item in the kit or set indicated in the quantity incorporated in unit column. When the part

to be used differs between serial numbers of the same model, the effective serial numbers are shown as the last line of the description. In the Special Tools List, the initial basis of issue (BOI) appears as the last line in the entry for each special tool, TMDE, and support equipment. When density of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased accordintly.

g. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr, etc.). When the unit of measure differs from the unit of issue, the lower unit of issue that will satisfy the required units of measure will be requisitioned.

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable, (e.g., shims, spacers, etc.).

The next printed page is C-5.

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						SECTION III—REPAIR PARTS LIST GROUP 01 CRADLE		
C-1	1	PAOZZ	4010-00-623-7376	13220E1033-1	97403	CABLE ASSEMBLY, TIE-DOWN	EA	1
C-1	2	PAOZZ	5340-00-937-0965	MS17984C615	96906	PIN, QUICK RELEASE	EA	1
C-1	3	MOOZZ		13220E1033FN8	97403	WIRE ROPE, QUICK RELEASE PIN APPROX 8 IN QD MFD FROM 4030-00-452-2568	EA	1
C-1	4	PAOZZ	4030-00-452-2568	MS51844-1	96906	SLEEVE, SWAGING WIRE ROPE	EA	2
C-1	5	PAOZZ		RRC271TYPE4CLASS 1 1-2IN	81348	SCHACKLE, TIE-DOWN CABLE	EA	1
C-1	6	XDOZZ		13220E1034	97403	HOOK, TIE-DOWN	EA	1
C-1	7	PAOZZ	4010-00-621-0770	13220E1033-2	97403	CABLE ASSEMBLY TIE-DOWN	EA	1
C-1	8	PAOZZ	5340-00-937-0965	MS17984C615	96906	PIN, QUICK RELEASE	EA	1
C-1	9	MOOZZ		13220E1033FN8	97403	WIRE ROPE, QUICK RELEASE PIN APPROX 8 IN REQ MFD FROM 4030-452-2568	EA	1
C-1	10	PAOZZ	4030-00-452-2568	MS51844-1	96906	SLEEVE, SWAGING WIRE ROPE	EA	2
C-1	11	PAOZZ	4010-01-011-8991	13220E1033-3	97403	CABLE ASSEMBLY TIE-DOWN	EA	1
C-1	12	PAOZZ	5340-00-937-0965	MS17984C615	96906	PIN, QUICK RELEASE	EA	1
C-1	13	MOOZZ		13220E1033FN8	97403	WIRE ROPE, QUICK RELEASE PIN	EA	1
C-1	14	PAOZZ	4030-00-452-2568	MS51844-1	96906	SLEEVE, SWAGING WIRE ROPE	EA	2
C-1	15	PAOZZ	5315-00-606-0063	13220E1029	97403	PIN, STRAIGHT HEADED SHACKLE	EA	1
C-1	16	PAOZZ	5310-00-950-1309	MS27183-31	96906	WASHER, FLAT STL CAD PLATED 1 1-2IN IDX3 1-4IN OD	EA	1
C-1	17	PAOZZ	5315-00-187-9415	MS24665-657	96906	PIN, COTTER 1-4 IN DIAX2 1-2 LONG BRASS	EA	1
C-1	18	PAOZZ		RRC271TYPE4CLASS 4 1 1-4IN	81348	SHACKLE	EA	1
C-1	19	PAOZZ		RRC271TY2CL2STL	81348	SHACKLE, TIE-DOWN CABLE	IN	16
C-1	20	PAOZZ		13220E1030-1	97403	CABLE ASSEMBLY, LASHING	EA	1
C-1	21	PAOZZ		13220E1030-2	97403	CABLE ASSEMBLY, LASHING	EA	1
C-1	22	XDOZZ		13220E1045	97403	PLATE IDENT	EA	1
C-1	23	PAOZZ	5320-00-117-5857	MS20470D6-10	96906	RIVET, SOLID 3-16DIAX5-8INLG	EA	4
C-1	24	XDOZZ		13220E1015	97403	COVER ACCESS	EA	2
C-1	25	PAOZZ	5305-00-069-5573	MS90725-85	96906	SCREW, CAP, HEXAGON HEAD 7-16-14X1 INCH LONG	EA	4
C-1	26	PAOZZ	5310-00-209-0965	MS35338-47	96906	WASHER, LOCK 7-16 NOMINAL SIZE CD PLD	EA	4
C-1	27	PAOZZ	5310-00-809-4085	MS27183-16	96906	WASHER FLAT ROUND	EA	4
C-1	28	PAOZZ		RRC271TYPE4CLASS 1 7-8IN	81348	SHACKLE, CRADLE LIFTING AND LASHING CABLES	EA	1
C-1	29	PAOZZ		RRC271CL1TY4 7-8 IN	81348	SHACKLE, CRADLE LIFTING AND LASHING CABLES	EA	1
C-1	30	PAOZZ	5340-00-159-3746	MS17984C836	96906	PIN, QUICK RELEASE, STANCHION	EA	2
C-1	31	MOOZZ		13220E1010FN15	97403	WIRE ROPE, QUICK RELEASE PIN MFD FROM 4010-00-892-3068	EA	4
C-1	32	PAOZZ	4030-00-452-2568	MS51844-1	96906	SLEEVE SWAGING WIRE ROPE	EA	2
C-1	33	XDOZZ		13220E1031	97403	STANCHION, CRADLE	EA	2
C-1	34	XDOZZ		13220E1013	97403	STANCHION, BOAT GUIDE	EA	1
C-1	35	PAOZZ	5340-00-159-3746	MS17984C836	96906	PIN, QUICK RELEASE, STANCHION	EA	2

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
C-1	36	PAOZZ		MILW83420TYPE2COMPOSITIONB	81349	WIRE ROPE 1-16DIA7X7CONST APPROX 104 IN REQD	IN	8
C-1	37	PAOZZ	4030-00-452-2568	MS51844-1	96906	SLEEVE SWAGING WIRE ROPE	EA	2
C-1	38	PAOZZ		MS90726-124	96906	SCREW, CAP, HEXAGON HEAD 1-2-20X4.250 L	EA	2
C-1	39	PAOZZ	5310-00-062-4954	MS21045-8	96906	NUT, PLAIN HEXAGON 1-2-20 UNJF-3B CD PLD	EA	2
C-1	40	PAOZZ		RRC271TYPE4CLASS1 1IN	81348	SHACKLE	EA	2
C-1	41	PAOZZ	4020-00-586-0469	13220E1032	97403	ROPE ASSEMBLY	EA	2
C-1	42	PAOZZ		13220E1033-4	97403	CABLE ASSEMBLY TIE-DOWN	EA	1
C-1	43	PAOZZ		MS179846615	96906	PIN, QUICK RELEASE	EA	1
C-1	44	MOOZZ		13220E1033-7	97403	WIRE ROPE, QUICK RELEASE PIN	EA	1
C-1	45	PAOZZ		MS51844-1	96906	SLEEVE, SWAYING WIRE ROPE	EA	2
C-1		MOOZZ		MS51844-1	96906	PAD, RUBBER MED FROM ASTM-D2000GRADE1B	EA	5

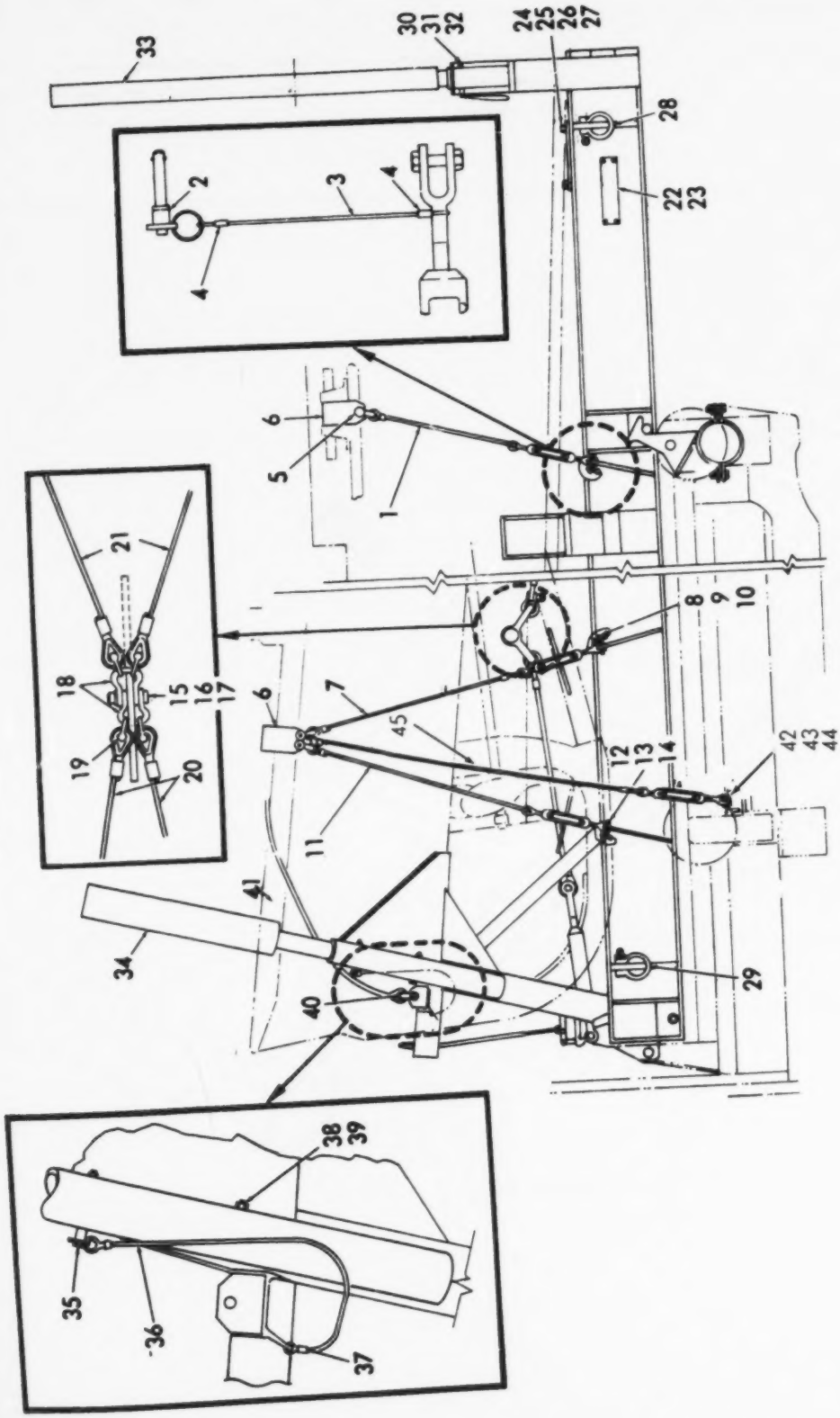
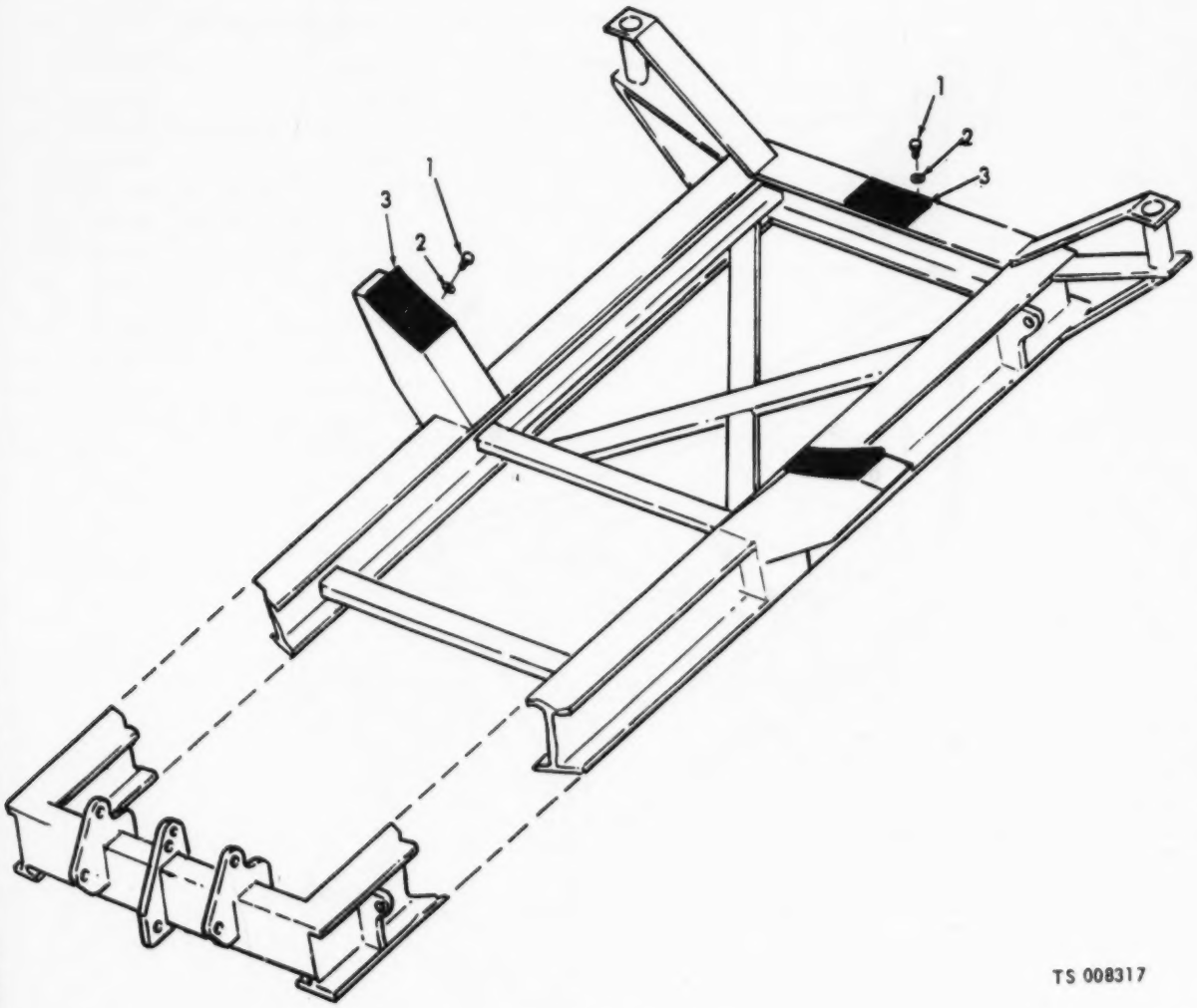


Figure C-1. Boat cradle assembly.

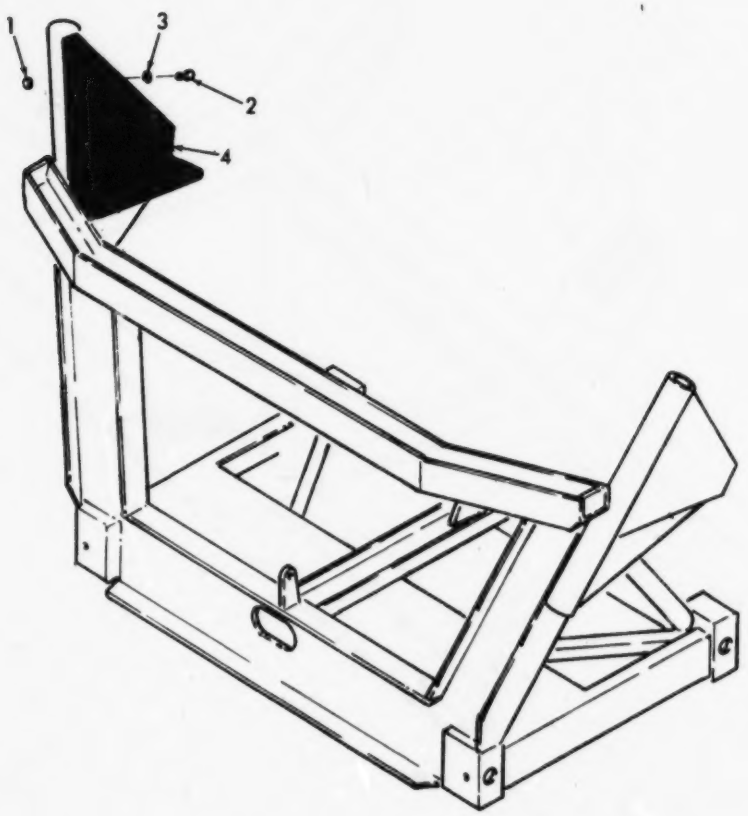
(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
C-2	1	PAOZZ	5305-00-984-5691	MS35206-311	96906	SCREW,MACHINE PAN HEAD	EA	8
C-2	2	PAOZZ	5310-00-080-6004	MS27183-14	96906	WASHER,FLAT,PAD MOUNTING	EA	1
C-2	3	MOOZZ				PAD,RUBBER MFD FROM ASTM#2000GRADE1B	EA	5



TS 008317

Figure C-2. Cradle frame assembly.

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 02 DOLLY, BOAT CRADLE		
C-3	1	PAOZZ	5310-00-732-0558	MS51967-8	96906	NUT, PLAIN HEX HEAD	EA	14
C-3	2	PAOZZ	5305-00-984-5691	MS35206-311	96906	SCREW,MACHINE, PAN HD	EA	14
C-3	3	PAOZZ	5310-00-080-6004	MS27183-14	96906	WASHER,FLAT,PAD MOUNTING	EA	14
C-3	4	MOOZZ				PAD,RUBBER MFD FBCR ASTMD2000GRAIHK18	EA	2



TS 008318

Figure C-3. Dolly assembly.

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
C-4	1	PAOZZ		MILR27426-2114B	81349	RING,RETAINING	EA	1
C-4	2	XDOZZ		13220E1017	97403	AXLE,ROLLER	EA	1
C-4	3	XDOZZ		13220E1019	97403	ROLLER	EA	1
C-4	4	XDOZZ		13220E1020	97403	BEARING,ROLLER	EA	1
C-4	5	PAOZZ		MZ7426-2114B	81349	RING,RETAINING	EA	1
C-4	6	XDOZZ		13220E1017	97403	AXLE,SHEAVE	EA	1
C-4	7	XDOZZ		13220E1018	97403	SHEAVE	EA	1
C-4	8	XDOZZ		13220E1020	97403	BEARING,SHEAVE	EA	1
C-4	9	PAOZZ	5420-00-060-7030	MILR52243 3 3-4LONG	81349	RETAINER,BRIDGE PIN	EA	1
C-4	10	PAOZZ		MS51109-173	96906	SCREW,CAP,HEX HD	EA	1
C-4	11	XDOZZ		13220E1024	97403	LATCH,BLOCK	EA	1
C-4	12	PAOZZ	5315-00-839-2325	132C7E300FN59	97403	PIN,COTTER,CABLE STOP 1-16DIAX1-2LG STL CAD PLD	EA	1
C-4	13	PAOZZ		13220E1049-3	97403	LOCK,CABLE STOP	EA	1
C-4	14	PAOZZ	5315-00-845-7787	MS24665-289	96906	PIN,COTTER 3-32DIAX1 1-2LG STL CD PLD	EA	4
C-4	15	PAOZZ	5310-00-809-5997	MS27183-17	96906	WASHER,FLAT-ROUND 1-21DX1 1-40DX083THK CD PLD	EA	4
C-4	16	PAOZZ	5315-00-081-7042	MS20392-7C37	96906	PIN,STRAIGHT HEADDED DRILLED SHANK 1-2DIAX1 5-32LG	EA	2
C-4	17	PAOZZ		MS20392-7C69	96906	PIN STRAIGHT,HEADDED DRILLED SHANK 1-2DIAX2 1-64LG STL CD PLD	EA	2
C-4	18	XDOZZ		13220E1023	97403	HOOK LATCH	EA	1
C-4	19	XDOZZ		13220E1021	97403	LINK CLEVIS	EA	1
C-4	20	XDOZZ		13220E1022	97403	LINK	EA	1
C-4	21	PAOZZ	5360-00-606-0057	13220E1028	97403	SPRING,LATCH 13-16DIAX2 3-4FREE LENGTH	EA	1

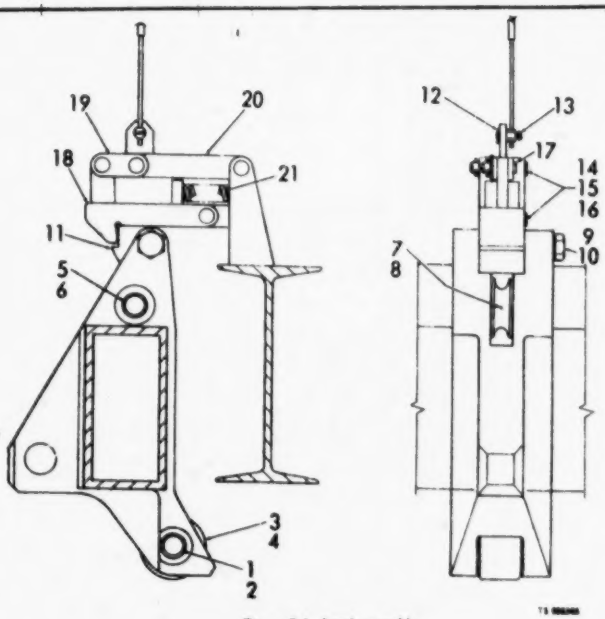


Figure C-4. Latch assembly.

TM-2090-200-12&P

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
C-9	5	PAOZZ	5310-00-539-5750	MS35650-302	96906	NUT,PLAIN HEXAGON NO 10-32 CD PLD	EA	6
C-9	6	PAOZZ	5310-00-045-3296	MS35338-43	96906	WASHER,LOCK NO 10 CD PLD	EA	7
C-9	7	PAOZZ	5305-00-990-6446	MS35207-261	96906	SCREW,MACHINE PAN HEAD NO 10-32X3-8LG	EA	4
C-9	8	XDOZZ		13220E1048	97403	CLAMP,CABLE	EA	1
C-9	9	PAOZZ	5310-00-043-0520	MS35650-3254	96906	NUT,PLAIN HEXAGON 1-4-20 CAD PLD	EA	2
C-9	10	PAOZZ	5310-00-582-5905	MS35338-44	96906	WASHER,LOCK 1-4 CD PLD	EA	2
C-9	11	PAOZZ	5305-00-993-2780	MS35207-280	96906	SCREW,MACHINE PAN HEAD	EA	2
C-9	12	XDOZZ		13220E1049	97403	CLAMP,CABLE	EA	1
C-9	13	PAOZZ	5305-00-C08-9044	MS35207-260	96906	SCREW,PAN HEAD CROSS RECESSED	EA	1
C-9	14	PAOZZ	5305-00-989-7035	MS35207-264	96906	SCREW,PAN HEAD	EA	6
C-9	15	XDOZZ	5340-00-079-7038	MS21333-67	96906	CLAMP,CABLE	EA	1
C-9	16	PAOZZ	3040-00-615-6359	13220E1025	97403	CABLE ASSEMBLY PUSH-PULL	EA	1
C-9	17	XDOZZ		13220E1046	97403	STANCHION,BOAT GUIDE	EA	1

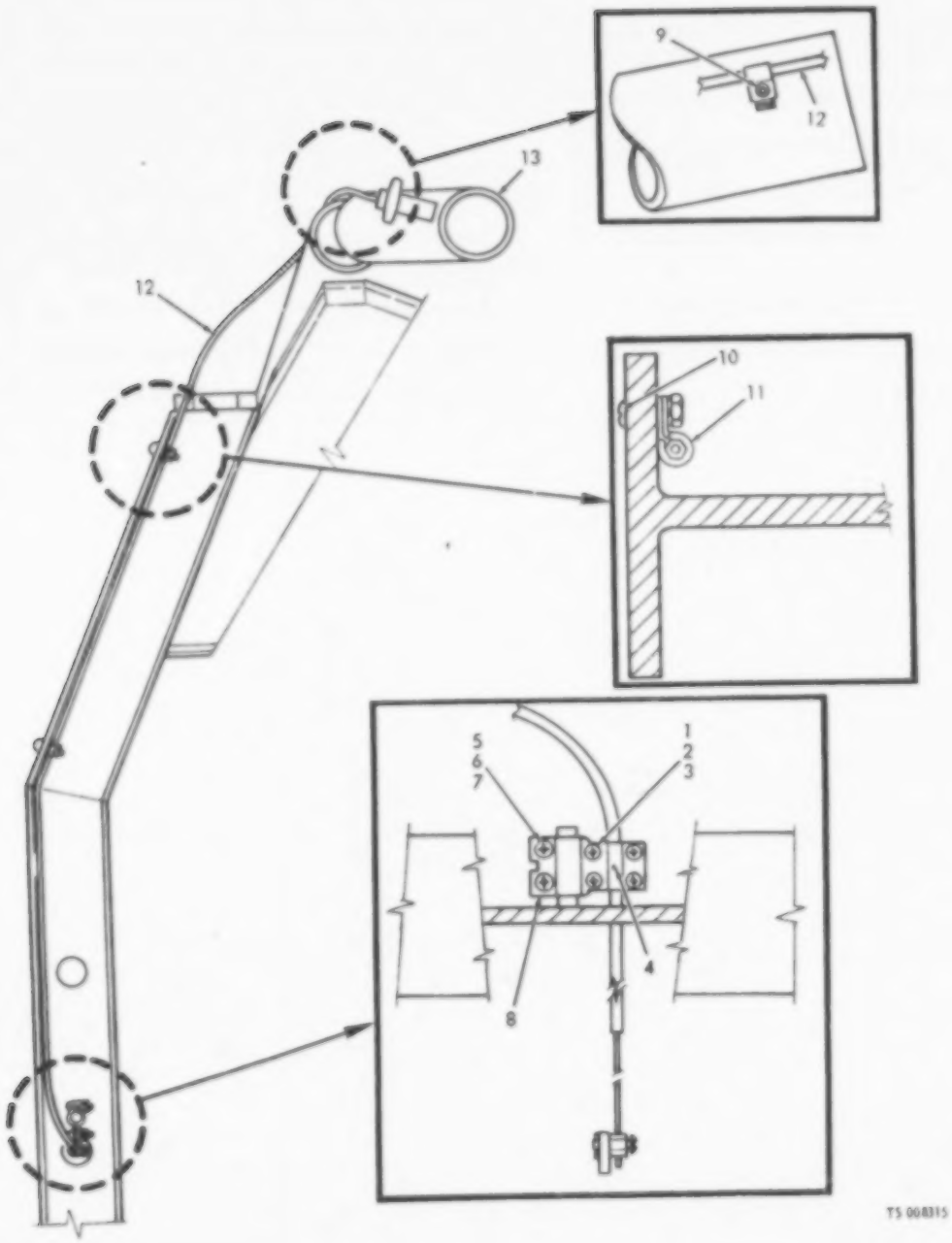


Figure C-6. Push-pull release cable.

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/ M	(8) QTY INC IN UNIT
C-6	1	XDOZZ		13220E1050	97403	WHEEL ASSEMBLY	EA	4
C-6	2	XAOZZ		MILB13501BRASSCO MPOSITIONB	81349	BUSHING	EA	2
C-6	3	PAOZZ	4730-00-060-4203	MS15001-1	96906	FITTING, LUBRICATION 1-4-28 TAPER THREAD	EA	1
C-6	4	XDOZZ		13220E1012	97403	WASHER THRUST	EA	1
C-6	5	PAOZZ	5305-00-226-7768	MS90726-115	96906	SCREW, CAP, HEXAGON HEAD 1-2-20X2IN LONG	EA	4
C-6	6	PAOZZ	5310-00-809-5998	MS27183-18	96906	WASHER FLAT, ROUND 17-32IDX1 1-16ODX095THK	EA	4
C-6	7	PAOZZ	5310-00-584-5272	MS35338-48	96906	WASHER, LOCK 1-2 IN CD PLD	EA	4
C-6	8	XDOZZ		13220E1027	97403	AXLE, DOLLY	EA	1
C-6	9	PAOZZ	5310-00-087-4652	MS51922-17	96906	NUT, HEXAGON, SELF LOCKING 3-8-16UNC2B STL CD PLD	EA	46
C-6	10	PAOZZ	5310-00-809-4061	MS27183-15	96906	WASHER FLAT-ROUND 7-16IDX1INODXO83IN THK CD PLD	EA	46
C-6	11	XDOZZ		13220E1014	97403	RAIL, BOAT CRADLE	EA	2
C-6	12	PAOZZ	5305-00-269-2804	MS90726-61	96906	SCREW, CAP, HEXAGON HEAD 3-8-24X1 1-8IN LG	EA	4
C-6	13	PAOZZ	5310-00-080-6004	MS27183-14	96906	WASHER, FLAT, ROUND 13-32X13-16X065 THK	EA	1
C-6	14	XDOZZ		13220E1016	97403	PIN, CRADLE STOP LEFT HAND	EA	4

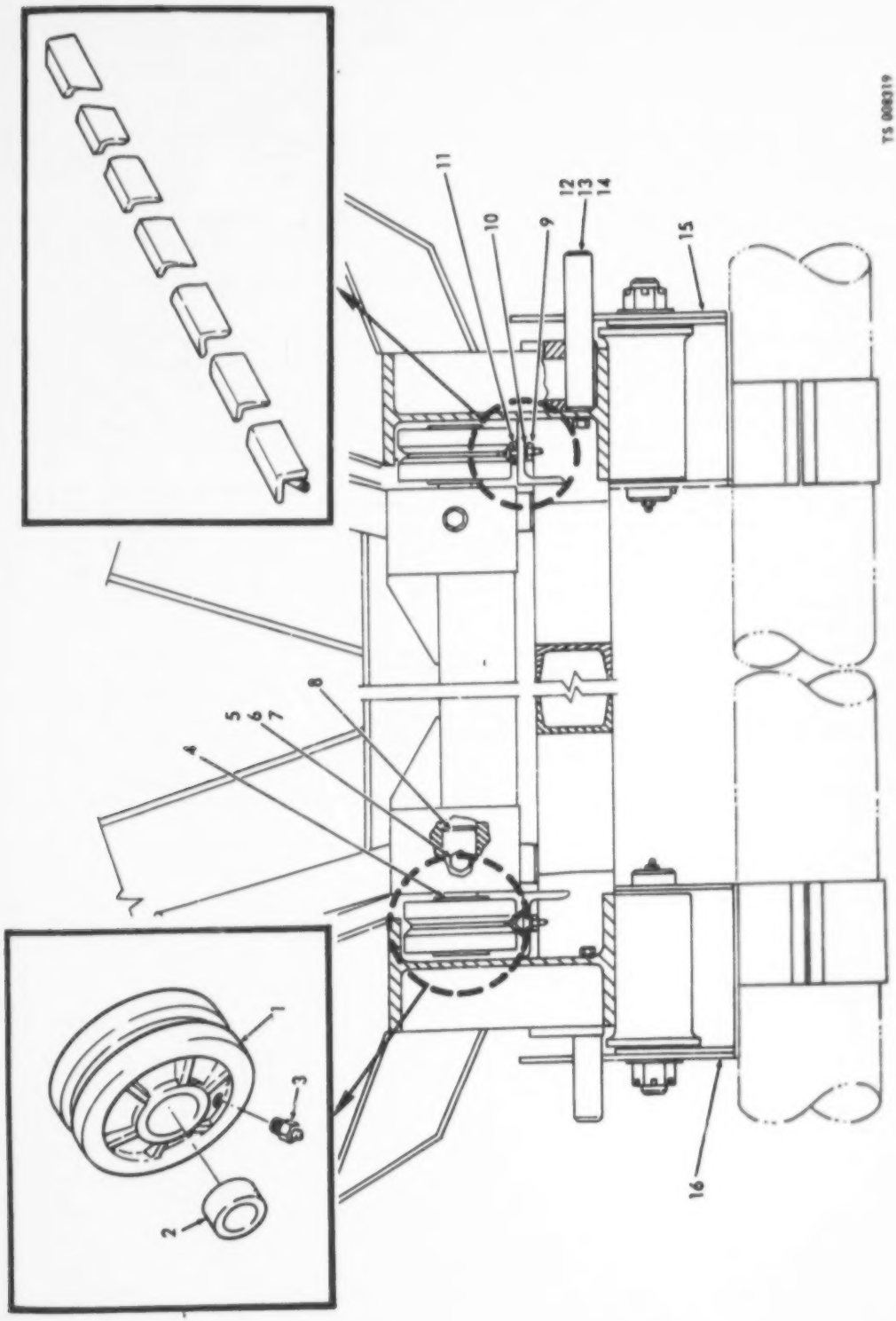
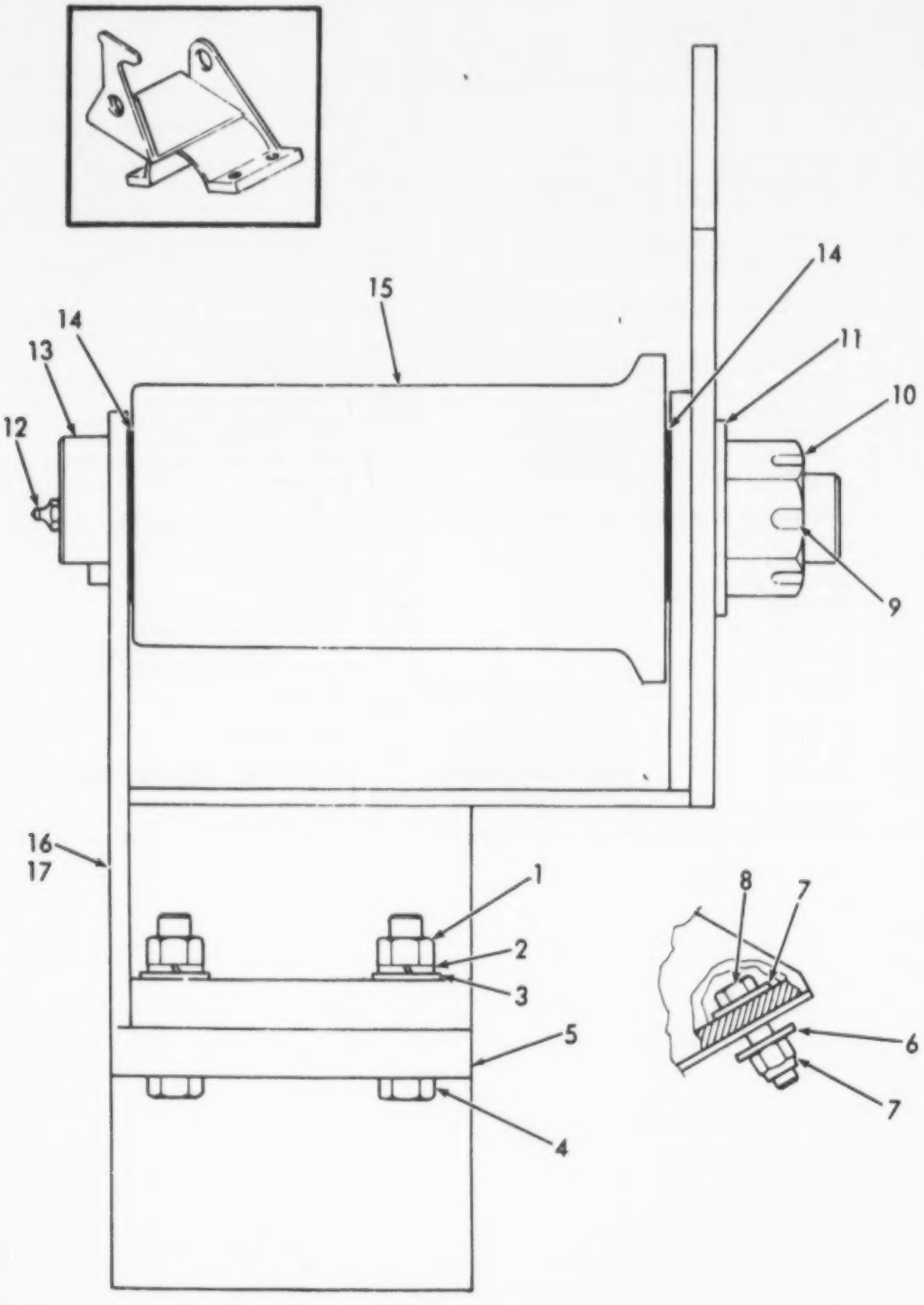


Figure C-6. Dolly, [illegible] ea.

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 03 ROLLER AND AXLE ASSEMBLIES		
C-6	15	PBOZH	2090-00-586-0351	13220E1041	97403	ROLLER ASSEMBLY RIGHT HAND	EA	1
C-6	16	PBOZZ	2090-00-582-2230	13220E1040	97403	ROLLER ASSEMBLY TRANSPORTER	EA	1
C-7	1	PAOZZ	5310-00-732-0560	MS51968-14	96906	NUT, PLAIN, HEXAGON 1-2-20 THREAD	EA	4
C-7	2	PAOZZ	5310-00-584-5272	MS35338-48	96906	WASHER, LOCK 1-2 INCH	EA	4
C-7	3	PAOZZ	5310-00-809-5998	MS27183-18	96906	WASHER, FLAT 17-32IDX1 1-16ODX095THK	EA	4
C-7	4	PAOZZ	5305-00-716-8181	MS90726-118	96906	SCREW, CAP, HEXAGON HEAD 1-2-20X2 3-4IN LG	EA	4
C-7	5	XAOZZ		13220E1039	97403	CAP, BRACKET	EA	1
C-7	6	PAOZZ	5310-00-087-4652	MS51922-17	96906	NUT, SELF LOCKING 3-8-16X1 1-2 LG	EA	1
C-7	7	PAOZZ	5310-00-809-4061	MS27183-15	96906	WASHER, FLAT	EA	2
C-7	8	PAOZZ	5305-00-269-3214	MS90725-64	96906	SCREW CAP, HEXAGON HEAD	EA	1
C-7	9	PAOZZ	5315-00-187-9415	MS24665-657	96906	PIN, COTTER 1-4INX2 1-2LG	EA	1
C-7	10	PAOZZ	5310-00-470-9340	MS35692-97	96906	NUT, SLOTTED-HEX 1 3-8-6THREAD	EA	1
C-7	11	PAOZZ	5310-00-960-1309	MS27183-31	96906	WASHER, FLAT 1-1-2IDX3 1-4ODX180THK	EA	1
C-7	12	PAOZZ	4730-00-050-4208	MS15003-1	96906	FITTING, LUBRICATION	EA	1
C-7	13	XAOZZ		13220E1036	97403	AXLE, ROLLER	EA	1
C-7	14	XDOZZ		13218E4046	97403	WASHER, THRUST	EA	1
C-7	15	XAOZZ		13220E1035	97403	ROLLER	EA	1
C-7	16	XAOZZ		13220E1038	97403	BRACKET, RH ROLLER	EA	1
C-7	17	XAOZZ		13220E1037	97403	BRACKET LH ROLLER	EA	1
						GROUP 04 GENERAL USE STANDARDIZED PARTS		
		PAOZZ		ASTMD2000GRADE1BC515 3-4INTHK	81346	RUBBER	FT	1
		PAOZZ		MILW83420 1-16DIA7X7CONSTRCRES	81349	WIRE ROPE	IN	18
		PAOZZ		MILW83420TYPE2COMPOSITIONB	81349	WIRE ROPE 1-16DIA7X7CONST	IN	8
		PAOZZ			8			



2090-200-12/C-7

Figure C-7. Roller assembly.

Section V. INDEX-NATIONAL STOCK NUMBER AND REFERENCE NUMBER CROSS-REFERENCE TO FIGURE AND ITEM NUMBER

REFERENCE NUMBER	MFG CODE	FIG NO	ITEM NO
ASTHD2000GRADE1BC515-3-4 INTHK	81346		
MILR27426-2114B	81349	C4	1
MILR27426-2114B	81349	C4	5
MILR52243-3-3-4LG	81349	C4	9
MILR52243-5-9-16 INLG	81349	C1	45
MILW83420-1-16DIA7X7 CONST	81349		
MILW83420TYPE2COM-POSITIONS	81349		
MILW83420TYPE2COM-POSITIONS	81349	C1	36
MS15001-1	96906	C6	3
MS15003-1	96906	C7	12
MS17984C615	96906	C1	2
MS17984C615	96906	C1	8
	96906	C1	12
MS17984C836	96906	C1	30
	96906	C1	35
MS20392-7C37	96906	C4	16
MS20392-7C69	96906	C4	17
MS20470D6-10	96906	C1	23
MS21045-8	96906	C1	39
MS21333-67	96906	C5	11
MS24665-289	96906	C4	14
MS24665-657	96906	C1	17
	96906	C7	9
MS27183-14	96906	C6	13
	96906	C6	13
MS27183-15	96906	C6	10
	96906	C7	7
MS27183-16	96906	C1	27
MS27183-17	96906	C4	15
MS27183-18	96906	C6	6
	96906	C7	3
MS27183-31	96906	C1	16
	96906	C7	11
MS35206-311	96906	C?	1
	96906	C	1
MS35207-260	96906	C5	9
MS35207-261	96906	C5	3
MS35207-264	96906	C5	10
MS35207-280	96906	C5	7
MS35338-43	96906	C5	2
MS35338-44	96906	C5	6
MS35338-47	96906	C1	26
MS35338-48	96906	C6	7
	96906	C7	2
MS35650-302	96906	C5	1
MS35650-3252	96906	C5	5
MS35690-97	96906	C7	10
MS51109-173	96906	C4	10
MS51844-1	96906	C1	4
	96906	C1	10
	96906	C1	14
	96906	C1	32
	96906	C1	37
MS51922-17	96906	C6	9
	96906	C7	6
MS51967-8	96906	C3	2
MS51968-14	96906	C7	1
MS87006-3	96906		
MS90725-64	96906	C7	8
MS90725-85	96906	C1	25
MS90726-115	96906	C6	5
MS90726-118	96906	C7	4
MS90726-124	96906	C1	38
MS90726-61	96906	C6	12
RRC271CL1TY4-7-8IN	81348	C1	29
RRC271TYPE4CLASS1-1-2IN	81348	C1	5
RRC271TYPE4CLASS1-1N	81348	C1	40
RRC271TYPE4CLASS1-7-8IN	81348	C1	28
RRC271TYPE4CLASS4-1-1-4IN	81348	C1	18
RRC271TY2CL2STL	81348	C1	19
13207E300FN59	97403	C4	12
13218E4046	97403	C7	14
13220E1010FN15	97403	C1	31
13220E1012	97403	C6	4
13220E1013	97403	C1	34
13220E1014	97403	C6	11
13220E1015	97403	C1	24
13220E1016	97403	C6	14
13220E1017	97403	C4	2
	97403	C4	6
13220E1018	97403	C4	7
13220E1019	97403	C4	3
13220E1020	97403	C4	4
	97403	C4	8
13220E1021	97403	C4	19
13220E1022	97403	C4	20
13220E1023	97403	C4	18
13220E1024	97403	C4	11
13220E1025	97403	C5	12
13220E1027	97403	C6	8
13220E1028	97403	C4	21
13220E1029	97403	C1	15
13220E1030-1	97403	C1	20
13220E1030-2	97403	C1	21
13220E0131	97403	C1	33
13220E1032	97403	C1	41
13220E1033-1	97403	C1	1
13220E1033-2	97403	C1	7
13220E1033-3	97403	C1	11
13220E1033FM8	97403	C1	3
	97403	C1	9
	97403	C1	13
13220E1034	97403	C1	6
13220E1040	97403	C6	16
13220E1041	97403	C6	15
13220E1042	97403	C1	42
13220E1043	97403	C1	43
13220E1044	97403	C1	44
13220E1045	97403	C1	22
13220E1046	97403	C5	13
13220E1048	97403	C5	4

Section V. INDEX - NATIONAL STOCK NUMBER AND REFERENCE NUMBER CROSS-REFERENCE TO FIGURE AND ITEM NUMBER

Stock Number	Figure No.	Item No.
5310-00-043-0520	C5	5
5310-00-045-3296	C5	2
4730-00-050-4203	C6	3
4730-00-050-4208	C7	12
5420-00-060-7030	C4	9
5315-00-064-2004	C4	17
5310-00-080-6004	C6	13
5315-00-081-7042	C4	16
5310-00-087-4652	C6	9
	C7	6
5305-00-088-9044	C5	9
5320-00-117-5857	C1	23
5340-00-159-3746	C1	30
	C1	35
5315-00-187-9415	C1	17
	C7	9
5310-00-209-0965	C1	26
5305-00-226-7768	C6	5
5305-00-269-2804	C6	12
5305-00-269-3214	C7	8
4030-00-270-5436		
4030-00-452-2568	C1	4
	C1	10
	C1	14
	C1	32
	C1	37
5310-00-470-9340	C7	10
2090-00-582-2230	C6	16
5310-00-582-5865	C5	6
5310-00-584-5272	C6	7
	C7	2
2090-00-586-0351	C6	15
4020-00-586-0469	C1	41
5360-00-606-0057	C4	21
5315-00-606-0063	C1	15
5305-00-716-8181	C7	4
5310-00-732-0560	C7	1
5310-00-809-4061	C6	10
5310-00-809-4061	C7	7
5310-00-809-4085	C1	27
5310-00-809-5997	C4	15
5310-00-809-5998	C7	3
5315-00-839-2325	C4	12
5315-00-845-7787	C4	14
4030-00-892-3065	C1	29
5310-00-937-0965	C1	2
	C1	8
	C1	12
5310-00-950-1309	C1	16
	C7	11
5305-00-984-5691	C2	1
	C3	1
5305-00-989-7435	C5	10
5305-00-990-6444	C5	3
5305-00-993-2738	C5	7

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Operator's Maintenance requirements for Boat Bridge Erection.

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
CoA, 3d ENGINEER BN
FT. LEONARD WOOD MO 63108

DATE 16 DEC 74

PUBLICATION NUMBER	DATE	TITLE
TM5-6115-200-20 AND P	1 APR 72	GENERATOR SET 10 KW NSN 6115-00-231-7286

BE EXACT. . .PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In the key to fig. 4-3, item 16 is called a shim. Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered so the NSN is wrong. Please give me a good NSN

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER: JOHN DOE, PFC (268) 317-7111

SIGN HERE: John Doe

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG DOTTED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

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PUBLICATION NUMBER	DATE	TITLE
TM 5-2090-200-12&P		Cradle, Boat, 27 Ft; Bridge Erection Boat, 2090-00-348-8138

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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

1. Do you feel the information contained in this change publication will assist you in the performance of your job?

☐ Yes

☐ No

2. Is the information in this change publication adequately displayed for ready reference to the basic publication?

☐ Yes

☐ No (Please give your recommendations for improvement.)

3. Please give us your job title and level of maintenance at which you are working.

_____

(job title)

_____

Maintenance level (org, DS, etc.)

OTHER COMMENTS

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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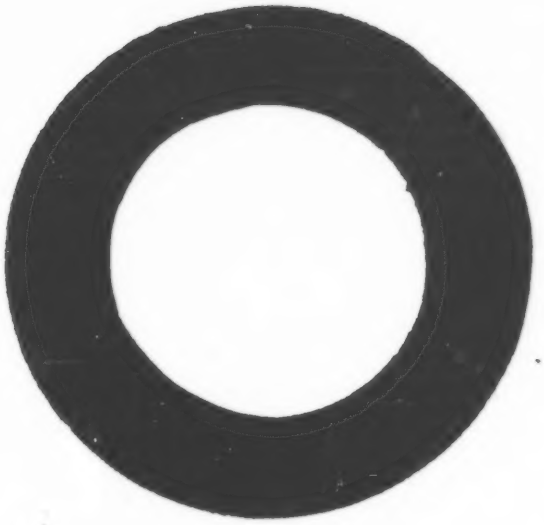

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigrams = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.82 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
square inches	square centimeters	6.451
square feet	square meters	.093
square yards	square meters	.836
square miles	square kilometers	2.590
acres	square hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29.573
pints	liters	.473
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907

To change	To	Multiply by
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
square centimeters	square inches	.155
square meters	square feet	10.764
square meters	square yards	1.196
square kilometers	square miles	.386
square hectometers	acres	2.471
cubic meters	cubic feet	35.315
cubic meters	cubic yards	1.308
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
liters	gallons	.264
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102